National Unit Specification

General information

Unit title: Causes and Prevention of Disease (SCQF level 4)

Unit code: HT6T 44

Superclass: RH

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Unit purpose

This unit is designed to provide learners with an understanding of the causes of infection and prevention of disease. This unit is suitable for learners studying at NC level, and will provide the necessary underpinning knowledge to enable progression to further study of the causes and prevention of disease at SCQF level 5.

Outcomes

On successful completion of the unit the learner will be able to:

1 Describe a range of diseases and the organisms that cause them.
2 Describe the body's defence mechanisms.
3 Describe the concept of infection control to minimise disease.

Credit points and level

1 National Unit credit at SCQF level 4: (6 SCQF credit points at SCQF level 4)

Recommended entry to the unit

Entry is at the discretion of the centre, however it is recommended that learners should have a basic understanding of infectious disease.

National Unit Specification: General information (cont)

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Core Skills

Opportunities to develop aspects of Core Skills are highlighted in the support notes for this unit specification.

There is no automatic certification of Core Skills or Core Skill components in this unit.

Context for delivery

If this unit is delivered as part of a group award, it is recommended that it should be taught and assessed within the subject area of the group award to which it contributes.

Equality and inclusion

This unit specification has been designed to ensure that there are no unnecessary barriers to learning or assessment. The individual needs of learners should be taken into account when planning learning experiences, selecting assessment methods or considering alternative evidence.

Further advice can be found on our website **www.sqa.org.uk/assessmentarrangements**.

National Unit Specification: Statement of standards

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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 SQA.

Outcome 1

Describe a range of diseases and the organisms that cause them.

Performance criteria

(a) The categorisation of the organism is correct with respect to its type.
(b) The description of the disease is correct with respect to:
  (i) identity
  (ii) mode of entry
  (iii) symptoms of disease

Outcome 2

Describe the body's defence mechanisms.

Performance criteria

(a) The description of the body's natural barriers to infection is correct.
(b) The description of the antigen antibody reactions is correct.
(c) The description of the action of phagocytosis to include the role of macrophages and neutrophils in the non-specific immune response is correct.

Outcome 3

Describe the concept of infection control to minimise disease.

Performance criteria

(a) The description of methods of infection control is correct with respect to:
  (i) sanitisation
  (ii) water treatment
  (iii) sewage treatment

(b) The description of immunisation is correct in terms of:
  (i) vaccination
  (ii) active immunity
  (iil) passive immunity

(c) The description of the mode of action of a chemotherapeutic agent is correct.

National Unit Specification: Statement of standards (cont)

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Evidence requirements for this unit

Evidence is required to demonstrate that learners have achieved all outcomes and performance criteria.

Written and/or oral recorded evidence for Outcomes 1-3 could be assessed using a holistic closed-book assessment under supervised conditions. Outcomes may also be assessed individually. It is recommended that the assessment — whether holistically or individually — be completed within 90 minutes.

Outcome 1

A learner's response will be judged satisfactory where the evidence shows that the learner can:

- categorise three specimens shown on prepared slides, diagrams, photographs or photomicrographs. The specimens must include three of the following: bacteria; viruses; fungi; protozoa; worms.
- describe a disease caused by bacteria.
- describe a disease caused by a virus.
- describe a disease caused by fungi.
- describe a disease caused by protozoa.
- describe a disease caused by worms.

The description of the diseases must include identity, mode of entry and symptoms of disease.

Outcome 2

A learner's response will be judged satisfactory where the evidence shows that the learner can:

- describe three of the body's natural barriers to infection.
- describe two antigen antibody reactions.
- describe the action of phagocytosis to include the role of macrophages and neutrophils in the non-specific immune response.

Outcome 3

A learner's response will be judged satisfactory where the evidence shows that the learner can:

- describe two methods of infection control with respect to: sanitisation; water treatment; sewage treatment.
- describe immunisation in terms of vaccination, active immunity and passive immunity
- describe the mode of action of one chemotherapeutic agent.

National Unit Support Notes

Unit title: Causes and Prevention of Disease (SCQF level 4)

Unit support notes are offered as guidance and 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

This unit is intended as part of the framework for the SCQF level 5 NC Applied Sciences group award but may be suitable for inclusion in other science awards. It is designed to provide learners with an understanding of the causes of infection and prevention of disease.

Outcome 1 — Describe a range of diseases and the organisms that cause them

Examples of diseases:

- Bacterial: Salmonella, Streptococcus, Staphylococcus (MRSA), Clostridium, Listeria, E. coli, hospital acquired pneumonia
- Viral: Rubella, Herpes, Hepatitis, HIV, Influenza, Verrucae, Ebola, SARs, HPV, Zika
- Fungal: Tinea pedis, Candida albicans
- Protozoa: Sleeping sickness (Trypanosoma), malaria (Plasmodium), amoebic dysentry (Entamoeba), Giardia, cryptosproidiosos
- Worms: roundworm, tapeworm, elephantiasis, liver fluke

Outcome 2 — Describe the body's defence mechanisms

- Body's natural barriers to include: skin, stomach acid, mucus membranes, pH, ciliated epithelium
- Antigen antibody to include: antitoxins, opsonins, agglutinins, precipitins
- The action of phagocytosis to include the role of macrophages and neutrophils in the non-specific immune response.

Outcome 3 — Describe the concept of infection control to minimise disease.

- Sanitation in terms of disinfectants and antiseptics
- Water treatment: filters, chlorine
- Sewage treatment: filter, sedimentation, bacterial action
- Types of vaccine: gamma globulins (Rubella), attenuated (BCG), toxoid (Tetanus), MMR
- Active immunity and passive immunity.
- Chemotherapeutic agents: antibiotics, sulphonamides, antifungal, antiviral drugs.

National Unit Support Notes (cont)

Unit title: Causes and Prevention of Disease (SCQF level 4)

Guidance on approaches to delivery of this unit

There is no particular order in which Outcomes 1–3 should be delivered, however delivery of Outcomes 1–3 in sequence would allow for continuity of learning.

Delivery of the unit could incorporate group working, presentations, case studies, use of text books, journals and individual research including the use of reputable internet websites, further supplemented by video clips and documentaries with the addition of experience of working safely in a laboratory.

Outcome 1 could commence with the definition of microorganisms, and the diseases caused by these. Delivery could be supplemented by discussion of media coverage of recent local and/or international outbreaks (eg Ebola) using differing media sources (documentaries, newspapers, journal articles). Learners could then be provided with a basic introduction to each microorganism. Pictures, video clips and Scanning Electron Micrographs (SEM) could be used. Learners could complete research based activities on all five microorganisms, supplemented by the mode of entry and symptoms of disease.

A description of a disease must include the identity of the organism causing the disease, detail of how the organism gains entry to cells and the symptoms of the disease related to that organism.

Outcome 2 should introduce learners to the immune response of the body to invading pathogens. Details of the interactions between host and pathogen should be explored. Delivery could commence with a brief introduction of the human immune system. Learners should be made aware that the immune system is a highly complex system in the body. This could be achieved through diagrams and video clips of the immune system. Learners should be taught that the skin is the primary barrier to stop microbes entering the body, skin produces substances which can kill some microorganisms, tears produced by tear ducts sweep away dust and microbes for protection. The functionality of ciliate epithelia cells in the trachea could then be discussed, along with the ability of stomach acid to kill microbes including the protective role of the mucus membranes.

Delivery could then focus on the response of phagocytic cells which include macrophages and neutrophils which destroy invading pathogens by phagocytosis. Phagocytosis is a process by which macrophages and neutrophils digest invading microbes with enzymes called lysozymes which are contained in vesicles in their cytoplasm. The specific immune response of B-cells produces antibodies to the invading microorganism that targets them for digestion by phagocytes. Antibodies have the ability to bind to invading pathogens, resulting in antigenic binding. This marks pathogens to be destroyed. Learners should have an understanding of this in terms of antitoxins, opsonins, agglutinins and precipitins. A leaflet/poster/PowerPoint presentation would lend itself well to the learner experience of this section.

National Unit Support Notes (cont)

Unit title: Causes and Prevention of Disease (SCQF level 4)

Outcome 3 could commence with learners investigating different methods of infection control (the use of disinfectants and antiseptics) within society in sufficient detail to enable them to describe the process. Learners would be expected to apply their knowledge to the practical problems that arise in society in relation to sanitation. Learners should be able to clearly state the use of disinfectant and antiseptics, and this could lead onto discussion of their uses in industry and the personnel responsible for sanitation (i.e catering, hospitals, care-homes, kitchens). Learners could create video blogs/diaries of how they carry out the process of sanitation in their own residence or place of work. Learners could also create case studies of recent hospital outbreaks of diseases which highlights the importance of the use of disinfectants and antiseptics to control the spread of infectious agents. These could include MRSA, *Clostridium difficile* and hospital acquired pneumonia. Learners should be able to name different types of disinfectants and antiseptics and how they work. Delivery could then focus on giving learners a brief overview of the manner in which water is treated and cleaned and the methods employed. This could cover the use of chemicals emphasising the use of chlorine and filtration systems that are put in place to achieve sanitation of water. Learners could construct a flow chart or diagrams to display the various stages that occur during water filtration and the importance microbes play in producing clean drinking water. At this stage, delivery could cover dysentery and cholera in developing countries to reinforce content covered in Outcome 2. It is recommended, but not mandatory, that learners visit a local water sanitation site or employees of such establishments visit centres to provide informative talks in relation to their job roles in industry, highlighting future career opportunities. Active learning could play a large part in the learning and teaching of this section.

Learners will progress to gain an understanding of immunisation and vaccination programs, and learners should feel confident to be able to provide descriptions of active and passive immunity in relation to immunisation and vaccination programs. Learners should also be able to state that passive immunity is the transfer of humoral immunity via antibodies, this process occurs natural between a developing foetus through the placenta and also artificially via vaccines that contain high levels of a specific antibody to a pathogen or toxin. Active immunity is the natural defence mechanism that results in the production of antibodies by the immune system in response to the presence of antigens from invading pathogens, this form of immunity can be acquired artificially via vaccines that contain a deactivated form of an antigen from a pathogen.

Learners should have the opportunity to research different types of vaccines which should include gamma globulins (Rubella), attenuated (BCG), toxoid (Tetanus) and MMR. Learners should have a clear understanding of how these vaccines are made. Learners could be split into working groups and asked to research the mode of action of a specific vaccine, which could be supplemented by an individually produced PowerPoint presentation. Finally, learners should feel confident to describe the mode of action of chemotherapeutic agents to include: antibiotics, sulphonamides, antifungal and antiviral drugs.

National Unit Support Notes (cont)

Unit title: Causes and Prevention of Disease (SCQF level 4)

Guidance on approaches to assessment of this unit

Evidence can be generated using different types of assessment. The following are suggestions only. There may be other methods that would be more suitable to learners.

Outcomes 1-3 could be assessed by a single holistic closed-book assessment with a cut-off score of 60%. Outcomes may also be assessed individually. Assessment should be carried out in supervised conditions, and it is recommended that the assessment — whether holistically or individually — be completed within 90 minutes

A single instrument of assessment containing both extended and restricted response questions could be used.

Centres are reminded that prior verification of centre-devised assessments would help to ensure that the national standard is being met. Where learners experience a range of assessment methods, this helps them to develop different skills that should be transferable to work or further and higher education.

Opportunities for e-assessment

E-assessment may be appropriate for some assessments in this unit. By e-assessment we mean assessment which is supported by Information and Communication Technology (ICT), such as e-testing or the use of e-portfolios or social software. Centres which wish to use e-assessment must ensure that the national standard is applied to all learner evidence and that conditions of assessment as specified in the evidence requirements are met, regardless of the mode of gathering evidence. The most up-to-date guidance on the use of e-assessment to support SQA's qualifications is available at **www.sqa.org.uk/e-assessment**.

Opportunities for developing Core and other essential skills

The delivery and assessment of this unit will provide learners with the opportunity to develop the Core Skill of *Information and Communication Technology (ICT)* at SCQF level 4.

Information and Communication Technology (ICT) — Accessing Information at SCQF level 4

Learners will be required to utilise internet search engines to source information on research topics.

History of changes to unit

Version	Description of change	Date

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General information for learners

Unit title: Causes and Prevention of Disease (SCQF level 4)

This section will help you decide whether this is the unit for you by explaining what the unit is about, what you should know or be able to do before you start, what you will need to do during the unit and opportunities for further learning and employment.

This is a 1 credit unit at SCQF level 4, which you are likely to be studying as part of a NC Applied Sciences programme. Before progressing to this unit it would be beneficial to have a basic understanding of infectious disease. This unit is designed to provide you with an understanding of the causes of infection and prevention of disease.

On successful completion of the unit you should be able to:

1 Describe a range of diseases and the organisms that cause them.
2 Describe the body's defence mechanisms.
3 Describe the concept of infection control to minimise disease.

Outcome 1

In this outcome you will learn about a range of different diseases caused by five separate microorganisms. You will also gain experience in laboratory based identification work by categorising specimens of microorganisms shown on prepared slides, diagrams, photographs or photomicrographs. The specimens will include the following microorganisms: bacteria; viruses; fungi; protozoa; worms.

Outcome 2

In this outcome you will gain an overall understanding of the human body's natural barriers to infection. You will also learn about the body's immune system and responses to invading pathogens. The interactions between host and pathogen will also be explored. This will include the actions of macrophages, neutrophils and B-cells.

Outcome 3

In this outcome you will learn about different methods of infection control within society and study infection control processes. This will include the role of sanitisation centres in providing clean water. You will also learn about the way in which water is treated and cleaned and the methods employed by microbes to provide effective sewage treatment. You will gain an understanding of immunisation and vaccination, researching different types of vaccines, how these are made, and their origins. You will also learn about active and passive immunity and the mode of action of chemotherapeutic agents such as antibiotics and antiviral drugs.

Assessment

For Outcomes 1 to 3, depending on which centre you attend, assessment may be conducted on an outcome by outcome basis or by one single assessment. Assessment will be conducted under closed-book conditions.

General information for learners (cont)

Unit title: Causes and Prevention of Disease (SCQF level 4)

Core Skills

Although there is no automatic certification of Core Skills in the unit, you will have opportunities to develop the Core Skill of *Information and Communication Technology (ICT)* at SCQF level 4.