

# Prevention and Control of Infection – *Clostridium difficile*

## Printable learning resource

### What is this resource?

This resource is based on the e-learning module “NES: Prevention and Control of Infection – *Clostridium difficile*” from the **Scottish Infection Prevention and Control Education Pathway**.

The aim of this document is to make the e-learning content available to learners who

- do not have regular access to a computer and/or a network
- do not yet have the necessary IT skills or confidence to complete e-learning
- have different needs and therefore e-learning is not suitable for them.

All screen captures from the original module are included.

### How should this resource be used?

This resource can either be

- uploaded as a PDF file to tablets or other digital devices without internet access, or
- printed. (Printing in black and white is sufficient.)
- All navigational instructions on the screens in this document should be ignored.
- We have given instructions on how to complete interactivities and questions.
- A space has been provided for staff to make any additional notes after each topic.

### Internet access

Internet access is required for the following:

**Online feedback form and web links** for additional resources. Staff should be enabled to use web links and complete the feedback form if at all possible.

**Online assessment.** The online version of this resource consists of the e-learning module and a separate online assessment, and staff should be enabled and encouraged to complete this online assessment locally.



[Learn how to navigate this module.](#)

Start

## Welcome

The module will provide staff with information on the following areas:

- What is *Clostridium difficile* (*C.difficile*)?
- How do people/children acquire *C. difficile*?
- Who is at risk of acquiring a *C. difficile* infection?
- How does a *C. difficile* infection spread?
- What is the treatment for a *C. difficile* infection?
- What do you need to do to stop *C. difficile* spreading?



## Aim and target audience

The aim of this module is to equip you with the knowledge and skills you need to prevent the spread of *C. difficile*.

This module is ideal for **all staff new to health and social care**. It is also suitable for **more experienced staff in any setting** who want to refresh their knowledge or update skills.



It's important that you complete the **Personal Protective Equipment (PPE)** and **Hand Hygiene** modules from the Scottish Infection Prevention and Control Education Pathway before starting this module.

[< PREV](#) [NEXT >](#)

## Learning outcomes

At the end of this module you will be able to do the following to stop the spread of *C. difficile* infection (CDI):

- Recognise the symptoms of a CDI early
- Recognise patients at risk of a CDI
- Select the correct method of hand hygiene when caring for *C. difficile* patients
- Take appropriate measures to break links in the chain of infection.

[< PREV](#) [NEXT >](#)

## Overview

There are 3 topics in this module:

- **Topic 1:** Introduction
- **Topic 2:** The Chain of Infection
- **Topic 3:** Stopping the Spread

Once you have visited **all the screens** in this module, you can access the separate assessment. You need to **score 80%** in the assessment to pass and get a certificate of completion.



This module should only take you about **30 minutes** to complete.

< PREV NEXT >



## Topic 1: Understanding the risks

In this topic you will learn:

- What is *Clostridium difficile* (*C. difficile*)?
- What is a *C. difficile* infection (CDI)?
- How do patients acquire a *C. difficile* infection?
- What are the symptoms of a CDI?
- Who is at risk?



Remember, you can use the **Menu** to jump to any screen or to check where you are in this topic.

< PREV NEXT >

## Key questions

What is  
*C. difficile*?

What is a  
*C. difficile* infection?

Antibiotics most frequently  
associated with CDI?

### What is *C. difficile*?

- *C. difficile* is a type of spore forming bacteria.
- *C. difficile* is present in the bowel in 2-5 % of the adult population.
- *C. difficile* does not require oxygen and can live well in the bowel, together with other bacteria, without causing any harm.

### What is a *C. difficile* infection?

- Some antibiotics or enteral feeds can interfere with the balance of normal bacteria in the bowel. (Antibiotics kill both good and bad bacteria).
- Some people can carry *C. difficile* in the gut without having any symptoms.
- If this is the case, *C. difficile* bacteria can multiply and produce toxins (poisons) which cause illness with symptoms such as diarrhoea.
- This is called a *C. difficile* Infection (CDI).

### Antibiotics most frequently associated with CDI?

- Clindamycin
- Cephalosporins
- Ciprofloxacin (Fluoroquinolones)
- Co-Amoxiclav (Broad spectrum penicillins)

**All antibiotics can predispose or be a risk factor for developing CDI.**

&gt; Topic 1:

Understanding the risks

## Fast facts

*C. difficile* infection (CDI) is a bacterial infection, causing diarrhoea with symptoms ranging from mild to very severe disease, which in some cases can lead to death.

Previous exposure to antibiotics is the main risk factor for development of CDI.

CDI is one of the most important healthcare associated infections.

CDI has been increasingly recognised in children.



Select each image to read about CDI in children, the impact on Patients and the impact on NHS Scotland.



&lt; PREVIOUS

NEXT &gt;



## CDI in Children

CDI in children can cause mild as well as life threatening disease.

Carriage rates vary from 2.5% -90% in newborns and infants under 2 years old.

Carriage rate decreases in older children.

Scottish guidance on testing for *C. difficile* recommends testing patients aged 3 years and above (routine testing is not recommended in children <1 year of age).

- Clinicians should remain vigilant to the possibility of CDI in diarrhoeal cases in this population.
- In all cases, testing results must be carefully evaluated against the clinical background.



## Impact on patients

- Patients suffer and get harmed unnecessarily by the spread of *C. difficile*.
- *C. difficile* is the most common bacterial cause of healthcare associated gastro-intestinal infection in adults.
- CDI and outbreaks of CDI can lead to illness ranging from mild diarrhoea to life threatening colitis and in 5-10% of cases, death.

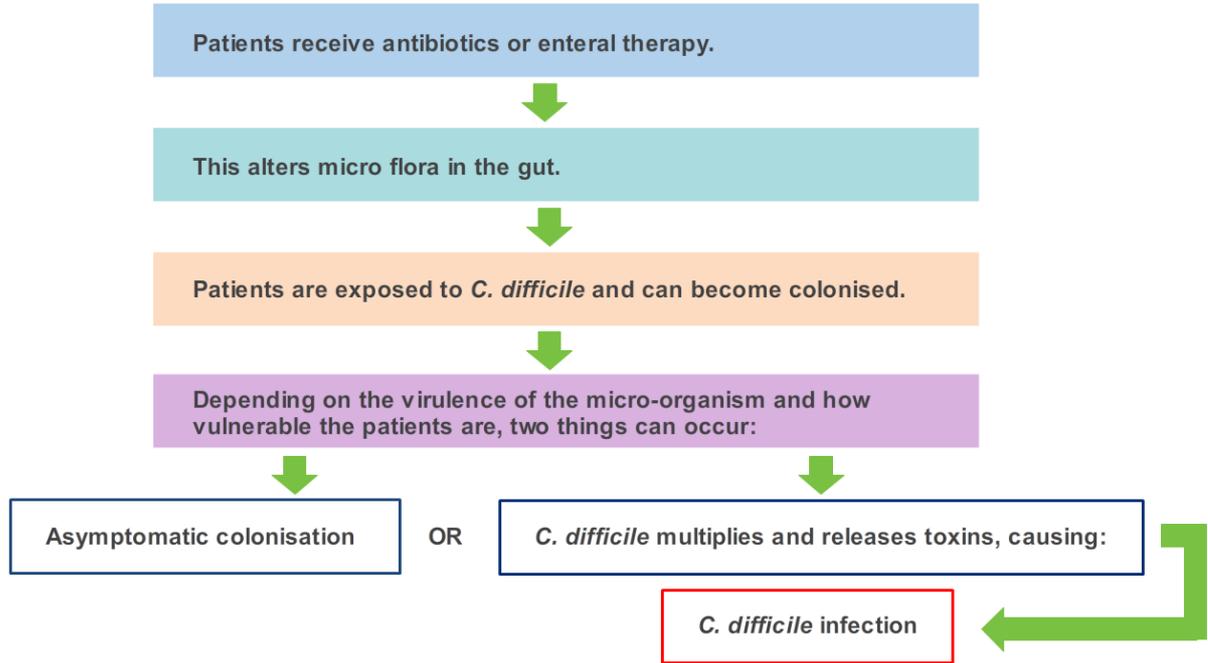


## Impact on NHS Scotland

- CDI causes morbidity, mortality and service disruption.
- Patients with CDI can spend 1-3 weeks longer in hospital.
- Prolonged hospital stays lead to increased pressure on beds and increased costs.
- CDI is not only hospital related. There are a number of cases occurring in the community which may be linked to antibiotic use in primary care.



## How do patients acquire *C. difficile*?



## CDI Key Questions

- Who is at risk of acquiring a *C. difficile* infection (CDI)?
- What are the symptoms of a *C. difficile* infection (CDI)?
- What is the definition of diarrhoea?
- How does a *C. difficile* infection (CDI) spread?

### To get a *C. difficile* infection (CDI):

- The bowel flora must be altered.
- The bowel must be colonised with a toxigenic strain of the micro-organism.
- The organism must grow and produce its toxins.

### Certain persons are at increased risk of acquiring CDI.

#### Major Risk Factors:

- Current or recent (within the last three months) **use of antibiotics**, e.g. cephalosporins, broad spectrum penicillins, fluoroquinolones and clindamycin.
- Increased **age**.
- Prolonged **hospital stay**.
- Serious **underlying diseases**.
- **Surgical procedures** (in particular bowel procedures).
- **Immunosuppression** including HIV infection and transplant patients and/or
- Use of **proton pump inhibitors**, (drugs which reduce the production of stomach acid) for example omeprazole.

#### Important points to remember:

- Symptoms **can** occur **up to 8 weeks** after discontinuation of antibiotic treatment.
- Symptoms **usually** occur **between day 4 and 9** of antibiotic treatment.
- The most common symptom of CDI is diarrhoea, but severe CDI is **not always** associated with diarrhoea.

**People over the age of 65 account for three-quarters of all CDI cases.**



Symptoms can occur 1 to 6 days after exposure to antibiotic.

- The main symptom of CDI is diarrhoea\*.
- For mild CDI, diarrhoea is usually the only symptom.
- Other features consistent with more severe or moderate forms of CDI include abdominal cramps, fever, even more frequent stool and raised white blood count.
- Other symptoms can arise in severe cases such as pseudomembranous colitis, toxic megacolon and peritonitis that can lead to death.

[Refer to Guidance on Prevention and Control of \*Clostridium difficile\* Infection \(CDI\) in Care Setting in Scotland](#). Please note severe CDI is not always associated with diarrhoea. Clinicians should therefore consider CDI in patients showing signs of ileus or have sepsis and some of the major risk factors.

\*Diarrhoea is defined as the passage of two or more loose or liquid per day, or more frequently than is normal for that individual. A sample of diarrhoea will conform to the shape of container.

If a patient is confirmed or suspected of CDI they should be isolated and [transmission based precautions](#) must be in place.



Diarrhoea is defined as the passage of three or more loose or liquid stools per day, or more frequently than is normal for the individual.

The frequent passing of formed stools is not diarrhoea.

## How does a *C. difficile* infection (CDI) spread?

**Clostridium difficile produces spores. Patients ingest *C. difficile* spores from the environment including contaminated surfaces. Healthcare workers, visitors and patients can spread the infection to themselves and others by not washing their hands correctly with liquid soap and water.**

### **Characteristics of spores:**

- adapted for survival, extremely hardy.
- tolerate air and heat.
- resistant to various detergents and disinfectants, including alcohol based hand rubs/gels.
- able to survive for extended periods in the environment (**several months**).

**Symptomatic CDI patients shed spores via their faeces (stool) into the environment at high rate.**

**This is the main source of contamination in the care environment of CDI patients, e.g. frequently touched surfaces around toilets, beds and commodes.**

**The main route of transmission of *C. difficile* is direct and indirect contact with**

- an infected (or colonised) person
- a contaminated surface or equipment

**and then touching the mouth or eating and swallowing the spores (also known as the faecal-oral route).**

## Notes for Topic 1: Understanding the risks



## Topic 2: The Chain of Infection

In this topic you will learn:

- What is the Chain of Infection?
- What is the Chain of Infection for *C. difficile*?
- What is the treatment for CDI?
- Who is at risk?



Remember, you can use the **Menu** to jump to any screen or to check where you are in this topic.

# The Chain of Infection

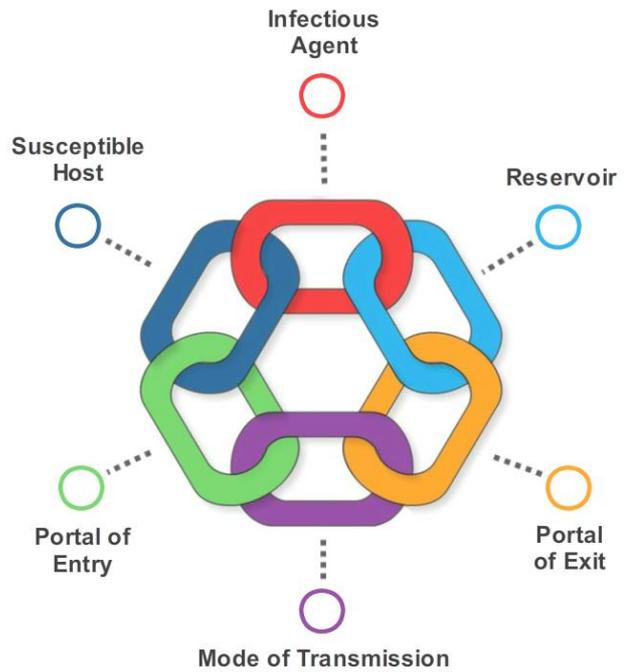
The **Chain of Infection** is a model which is used to describe how an infection is passed on.

It provides a step by step structure which enables you to break the chain so that infection transmission is prevented.

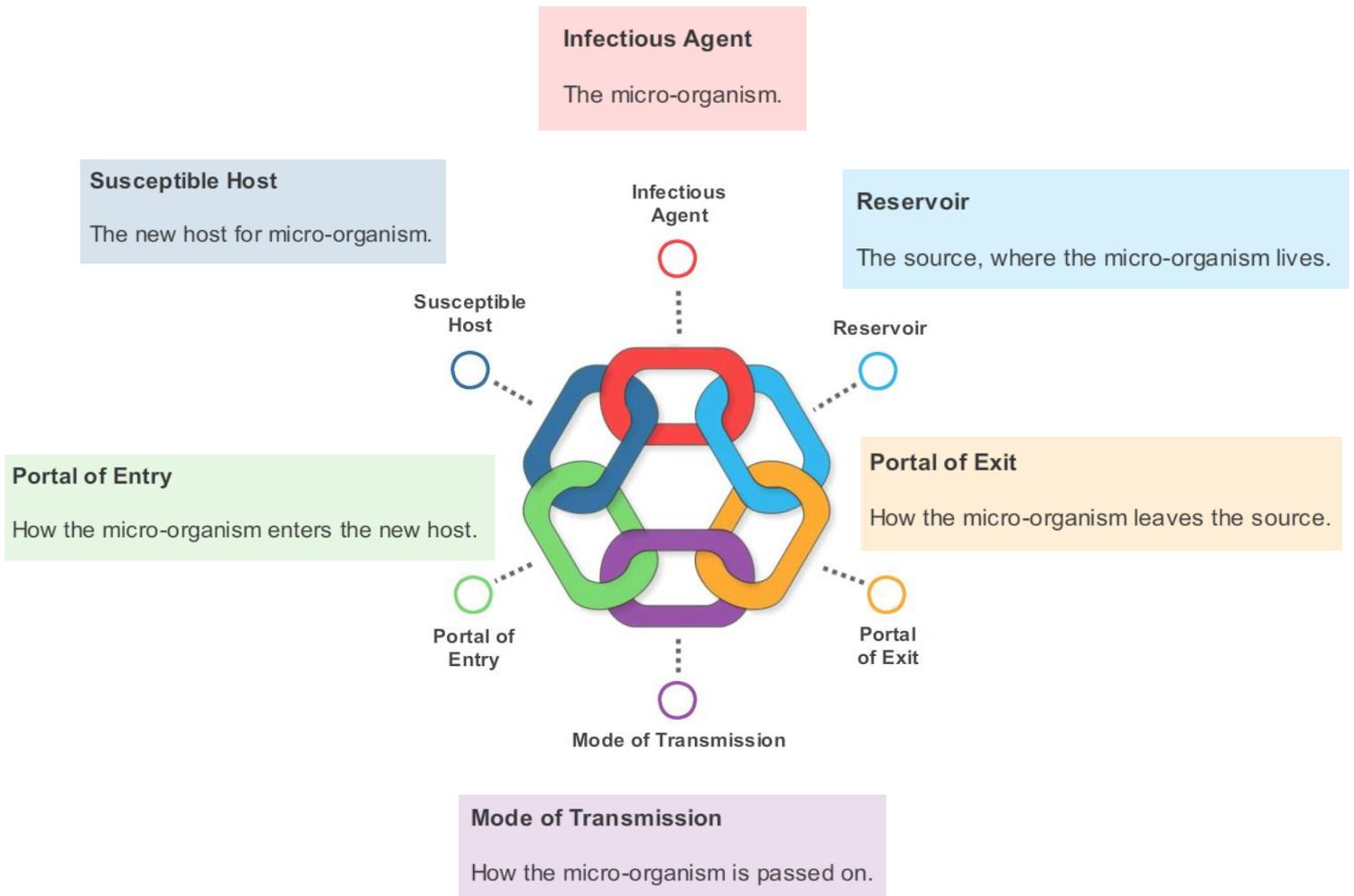
This is important in order to protect patients, staff, visitors and relatives.

If all the stages are present and the chain is not broken transmission of infection will occur.

On the next page you can explore the Chain of Infection.



< PREV    NEXT >



# The Chain of Infection (*C. difficile*)

This is the chain **SPECIFIC** to *Clostridium difficile* infection.

## Susceptible Host

Infants and young children, elderly or immunosuppressed patients, patients receiving antibiotics. Most at risk are elderly patients who have had antibiotics.

## Infectious Agent

*Clostridium difficile*.

## Reservoir

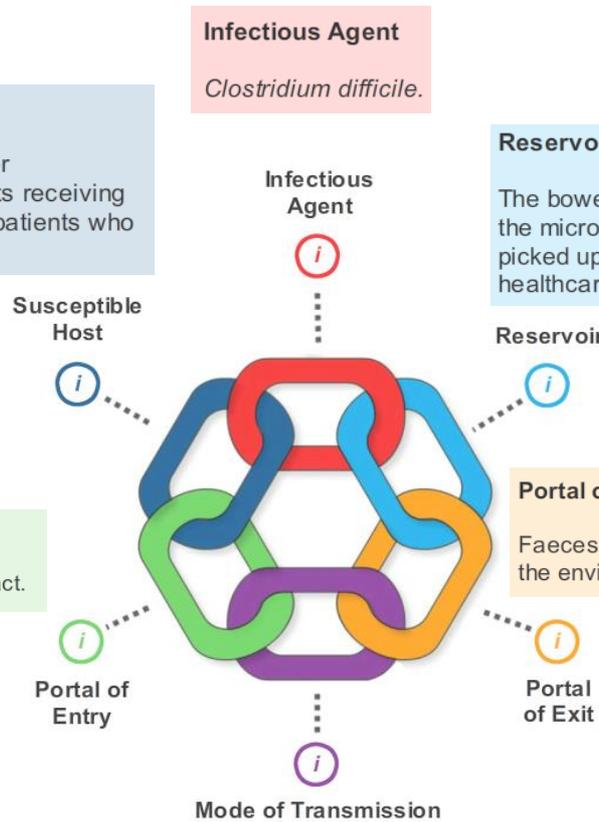
The bowel. Between 3 and 25% of patients have the micro-organism in their bowel. Otherwise it is picked up from the environment. Contaminated healthcare workers' hands are a problem!

## Portal of Entry

Oral intake, then gastro-intestinal tract.

## Portal of Exit

Faeces (diarrhoea). The micro-organism gets into the environment mostly via stools.



## Mode of Transmission

Faecal-oral route and contact. Airborne (spores), direct contact with faecal matter, indirect contact via shared equipment or the environment.

## Treatment for *C. difficile* infection

- Treatment should be started as soon as CDI is suspected.
- Treatment is either oral metronidazole or vancomycin depending on the severity of the symptoms.
- Do not wait for microbiology department/laboratory results to confirm diagnosis before initiating treatment.
- Treatment of CDI should be initiated based on assessment of symptoms and severity of disease while taking into account individual risk factors of the patient.
- There is no specific guidance regarding the treatment of children, but the treatment is similar to adults with the doses changed accordingly.

[< PREV](#) [NEXT >](#)

## Recurrence

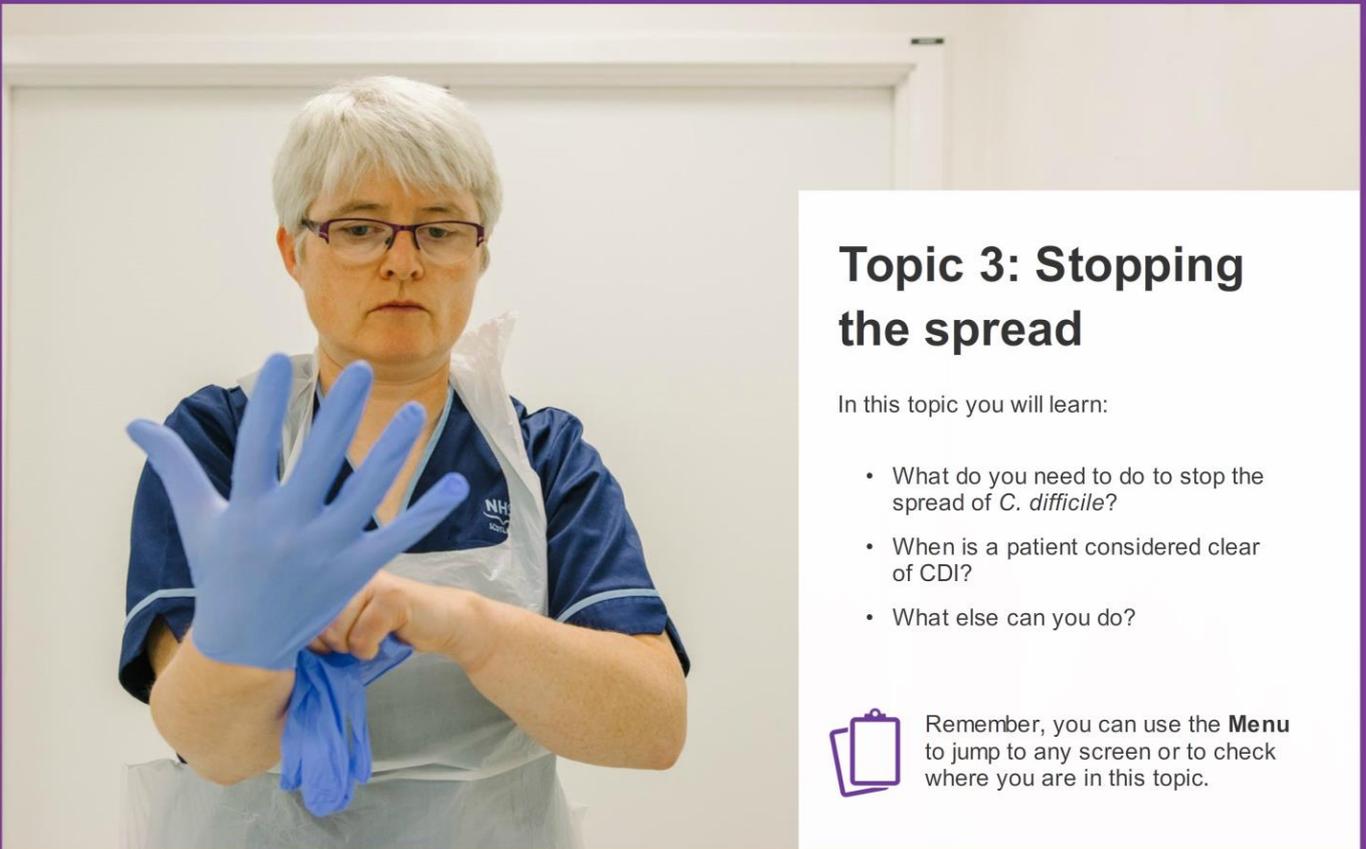
Recurrence can occur in patients with either mild/moderate or severe cases due to either re-infection from a contaminated environment or poor hand hygiene (i.e. a new infection), or relapse from germinating spores in the gut of the CDI patient.

Recurrence of CDI occurs in about 20% of patients after initial resolution of symptoms (but this varies between patient groups).

Recurrence is associated with significant increase of death.

[< PREV](#) [NEXT >](#)

## Notes for Topic 2: The Chain of Infection



### Topic 3: Stopping the spread

In this topic you will learn:

- What do you need to do to stop the spread of *C. difficile*?
- When is a patient considered clear of CDI?
- What else can you do?



Remember, you can use the **Menu** to jump to any screen or to check where you are in this topic.

## Stopping the spread of *C. difficile* infection

You need to strictly follow the **Standard Infection Control Precautions** (SICPs) and **Contact Precautions** explained in the [National Infection Prevention and Control Manual](#).

There are 5 main actions you must take to prevent cross transmission when an individual has known or suspected CDI.



Select each box to see them and then move onto the next slides to learn more about each action.

1. Isolate the patient if symptomatic.

2. Review antibiotic regimens and stop inappropriate antibiotics.

3. Use Personal Protective Equipment (PPE) correctly (gloves and apron).

4. Decontaminate equipment and the patient's immediate environment.

5. Perform hand hygiene correctly (with warm water and liquid soap, NOT alcohol based hand rub/gel).

National Infection Prevention and Control Manual link: <http://www.nipcm.hps.scot.nhs.uk/>

## &gt; Topic 3:

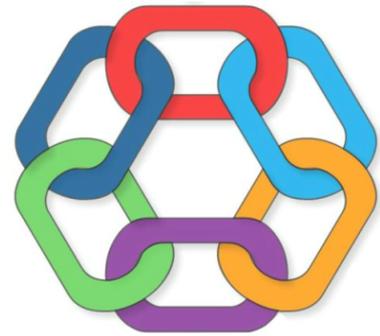
## Stopping the spread

## 1. Isolate the infectious patient

- Consider isolation for any patient who has loose stools or diarrhoea.
- Patients with a CDI should be isolated in a single room with en-suite facilities or an allocated commode until they are at least 48 hours symptom free and bowel movements have returned to patient's normal.
- CDI will recur in about 20% of patients.
- SICPs should always be in place, [transmission based precautions](#) are used in addition to prevent cross transmission of *C. difficile* spores.
- Arrange a terminal clean of a patient's room once they have been 48 hours asymptomatic and bowels have returned to normal. The patient can be moved.
- Ensure you follow local policy for isolation of patients with CDI.



Select the Chain of Infection image to see which link this breaks!



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Transmission based precautions link: <http://www.nipcm.hps.scot.nhs.uk/chapter-2-transmission-based-precautions-tbps/>

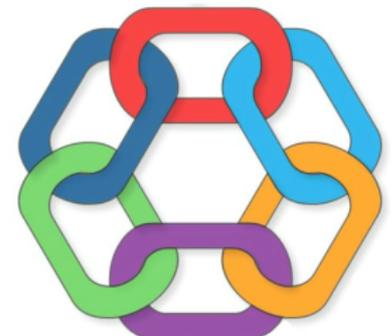
Answer:



### Mode of Transmission

Isolation and the use of a dedicated toilet facility ensure that other patients do not come into contact with any faecal matter.

(Strictly speaking, it is the transmission of *C. difficile* spores that is prevented).

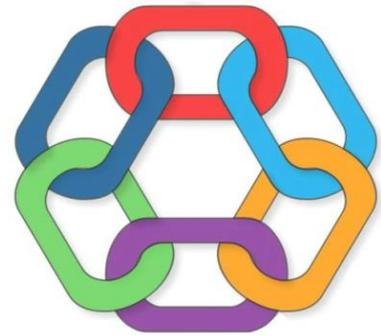


## 2. Stop antibiotic treatment if possible

- Review antibiotic therapy and stop unnecessary antibiotics as indicated by local antimicrobial policy (consult your local microbiologist or pharmacist).



Select the Chain of Infection image to see which link this breaks!



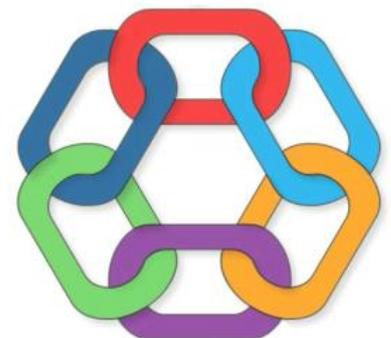
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Answer:



### Reservoir

Reviewing and stopping non clostridial antibiotic treatment, if possible, allows the gut flora to recover its natural population of healthy bacteria that protects against a *C. difficile* infection.



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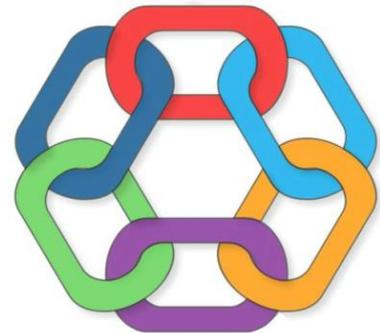
Stopping the spread

### 3. Use personal protective equipment (PPE) correctly

- Personal protective equipment (gloves and aprons) need to be put on prior to and subsequently removed following each care activity.
- Aprons should be worn for any contact with a patient and changed between patients. Always change gloves between patients and procedures.
- Remember to wash your hands before putting on and after removing gloves. (Hands often get contaminated during the removal and disposal of PPE). Do NOT use alcohol-based hand rub/gel.



Select the Chain of Infection image to see which link this breaks!



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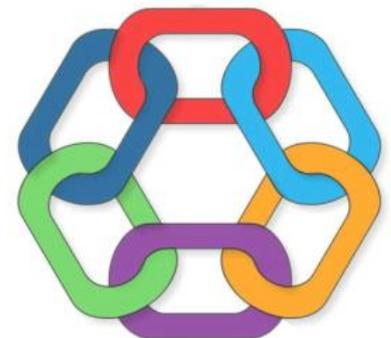
Answer:



#### Mode of Transmission

Personal protective equipment protects your clothing from contamination and stops the spread of *C. difficile* spores and transmission to other objects, staff and patients.

[Please click here to see the correct guidelines for putting on and removing PPE.](#)



Putting on and removing PPE link: <http://www.nipcm.hps.scot.nhs.uk/appendices/appendix-6-putting-on-and-removing-ppe/>

> Topic 3: Stopping the spread

## 4. Decontaminate equipment and the environment

*C. difficile* spores have been found virtually everywhere.

- on floors
- on care equipment: commodes, blood pressure, cuffs, stethoscopes
- on toilets
- on chairs
- on medical equipment
- on scales
- on beds.

Increased environmental cleaning is of paramount importance to decrease the risk of environmental cross contamination.

Pay particular attention to frequently touched surfaces such as:

- tables
- chairs
- telephones
- door handles
- flush and tap handles
- hand sets, e.g. call bells and bed controls.



< PREV NEXT >

> Topic 3: Stopping the spread

## 4. Decontaminate equipment and the environment (cont.)

What do we need to do when caring for CDI patients?

- The immediate environment has to be cleaned twice a day using neutral detergent followed by a disinfectant containing **1,000 parts per million (ppm) available chlorine** (or a combined detergent/chlorine releasing solution with **1,000 ppm available chlorine**).
- Care equipment e.g. blood pressure cuffs, thermometers and stethoscopes should be **dedicated to a single patient with CDI**.
- If surfaces are contaminated with **blood** then concentration of **10,000 ppm** of available chlorine should be used.



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&gt; Topic 3:

Stopping the spread

## 4. Decontaminate equipment and the environment (cont.)

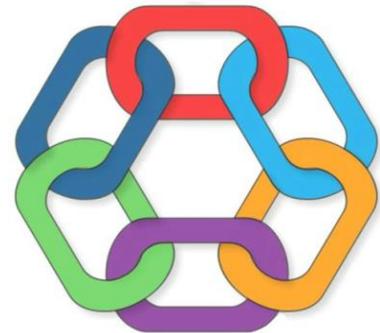


(!) Cross contamination of cleaning equipment can spread *C. difficile* spores.

Make sure you know and follow the **National Colour Coding Scheme** for cleaning materials and equipment! (This applies to domestic cleaning services.)

[View the National Colour Coding Scheme](#)

Select the image to see which link in the Chain of Infection decontamination breaks.



< PREV NEXT >

Answer:



### Mode of Transmission

Contaminated equipment is one of the greatest sources of transmission of the *C. difficile* spores.

*C. difficile* is transmitted by touching a contaminated object or surface and then touching your nose or mouth and ingesting the bacteria.





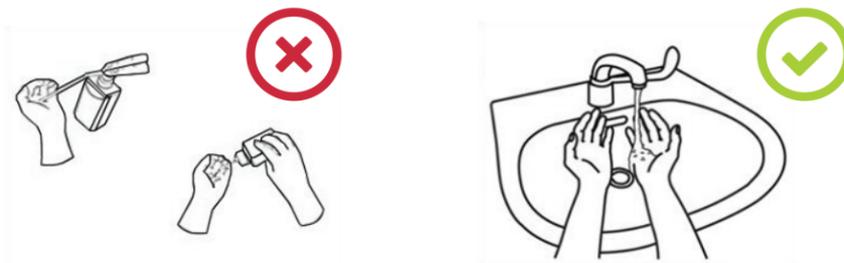
<b>Red</b>	<b>Blue</b>
Bathrooms, washrooms, showers, toilets, basins and bathroom floors	General areas including wards, departments, offices and basins in public areas
<b>Green</b>	<b>Yellow</b>
Ward kitchen areas and patient food service at ward level	Isolation areas

## 5. Perform hand hygiene correctly

### \*IMPORTANT\*

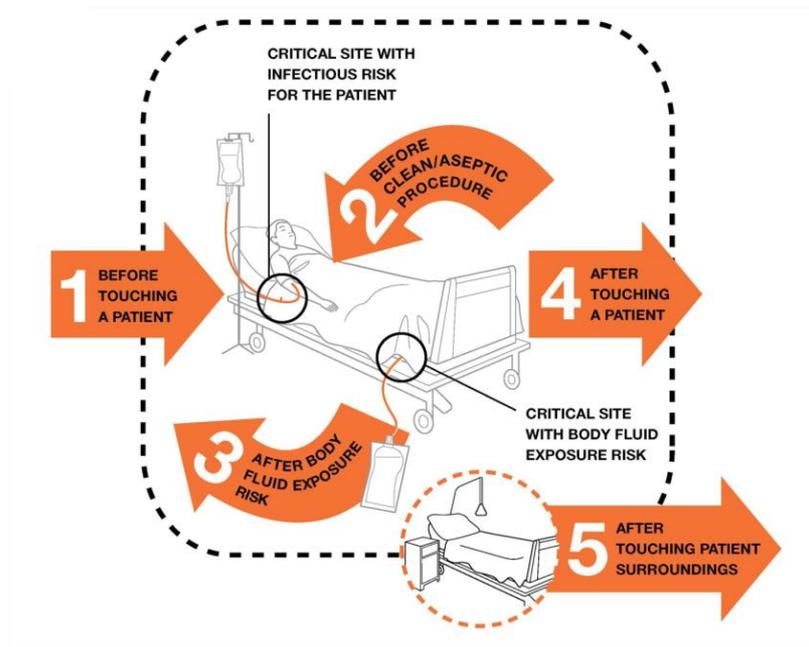
If you are caring for patients who have CDI you must use **liquid soap and water**, **NOT** alcohol-based hand rub/gel.

**ALCOHOL GEL IS NOT EFFECTIVE AGAINST *C. DIFFICILE* SPORES!**



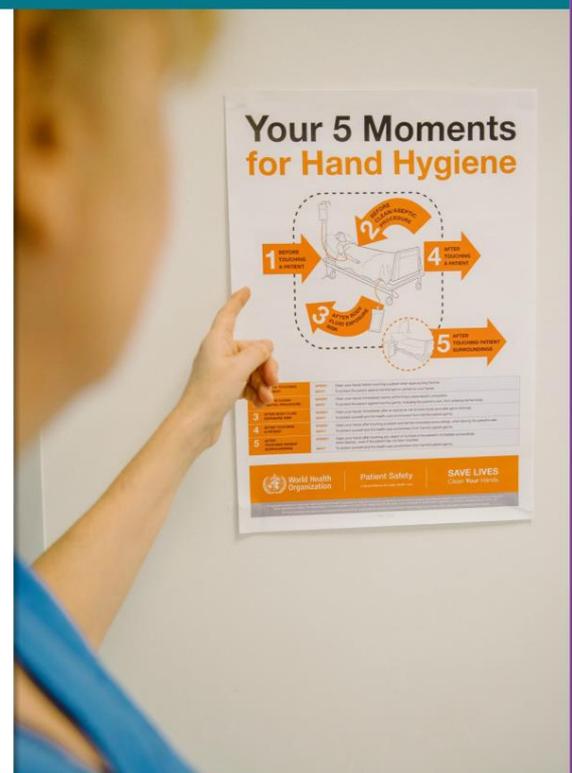
**\*REMEMBER\*** Alcohol based hand rub/gel is not effective in preventing CDI because it does not kill *C. difficile* spores and does not remove them from your hands. The only way to physically remove them is to wash your hands with **liquid soap and water**. Hand hygiene is particularly important when **leaving the patient area** of a CDI patient.

## 5 moments for hand hygiene



## What else can you do?

- Engage patients and visitors in preventing spread and reinfection, e.g. by educating them in hand hygiene and providing support.
- Ensure information leaflets on CDI and home laundering of patients clothes are made available to patients, residents, visitors and carers.
- Ensure staff follow local procedures and policies to prevent the spread of CDI.
- Monitor patient's fluid intake and frequency of diarrhoea.
- Speak to your line manager if there are any issues in your work area which prevent you from following the practice outlined in this module.

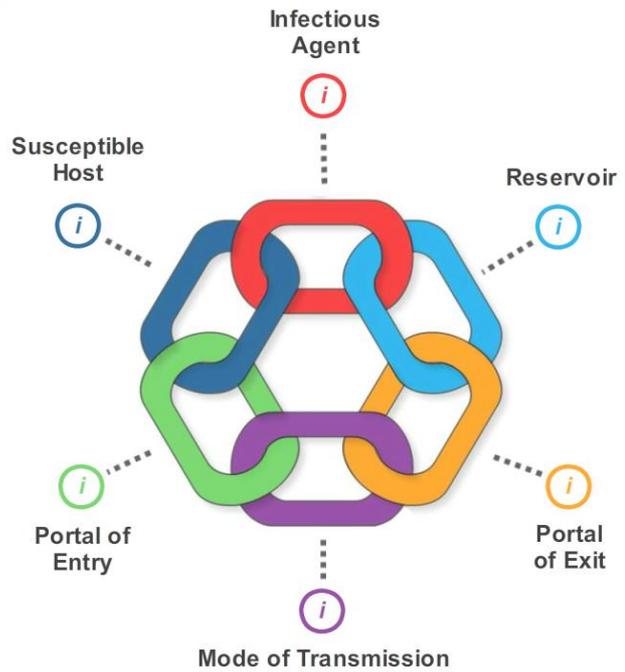


> Topic 3: Stopping the spread

# Breaking the Chain of Infection



Select each of the "i" buttons to recap on the chain of infection for *Clostridium difficile*.



< PREV NEXT >

**Infectious Agent: *C. difficile***

- Recognise symptoms early
- Accurately identify the micro-organism

**Susceptible Host**

- Recognise high risk patients
- Consider patient placement

**Reservoir: The Gut**

- Review antibiotics

**Portal of Entry**

- Use personal protective equipment
- Perform good hand hygiene

**Mode of Transmission: Faecal-oral route and contact**

- Isolation
- Perform good hand hygiene
- Decontaminate equipment and environment

**Portal of Exit: Faeces (diarrhoea)**

- Handle and dispose of body secretions properly
- Use personal protective equipment
- Decontaminate equipment and environment
- Perform good hand hygiene

## &gt; Topic 3:

## Stopping the spread

## CDI clearance

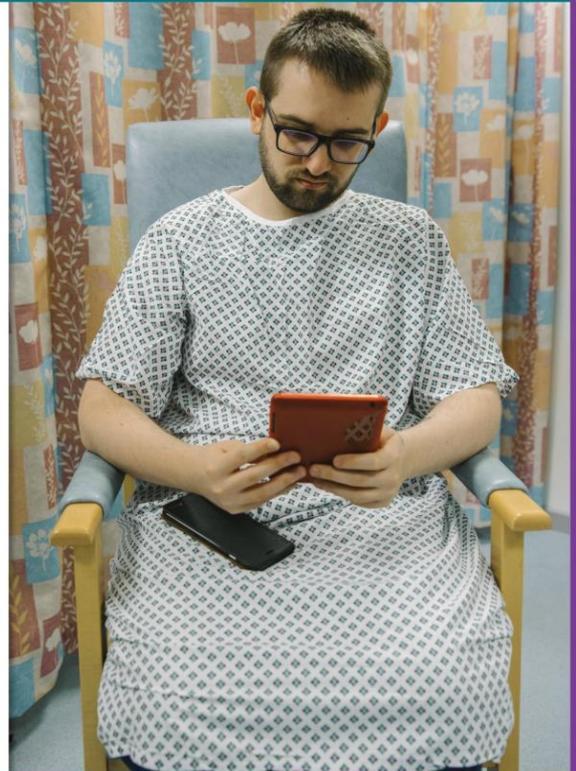
### When is a patient considered to be clear of a CDI?

- Symptoms need to be monitored daily.
- Patients are considered to be non-infectious if they have been asymptomatic (no diarrhoea) for 48 hours.
- You do not need to send specimens to the laboratory to confirm this. Clearance specimens are **NOT REQUIRED** nor accepted for testing by the microbiology department.



**REMEMBER:** The patient's bowel motions must have returned to normal.

- Precautions should continue until the patient has been asymptomatic of loss stools for 48 hours and bowel movements have returned to normal.



< PREV NEXT >

### Notes for Topic 3: Stopping the spread

&gt; Topic 3:

Stopping the spread

## Summary: Stopping the spread

To recap. There are 5 main actions you must take to prevent cross transmission when an individual has known or suspected CDI.

1. Isolate the patient if symptomatic.

2. Review antibiotic regimens and stop inappropriate antibiotics.

3. Use Personal Protective Equipment (PPE) correctly (gloves and apron).

4. Decontaminate equipment and the patient's immediate environment.

5. Perform hand hygiene correctly, using warm water and liquid soap, NOT Alcohol Based Hand Rub.

&lt; PREV NEXT &gt;

&gt; Topic 3:

Stopping the spread

## What to do next

### THINK

about what you can change in your practice to stop the spread of CDI.

### REPORT

to your line manager if you need any additional knowledge, resources, equipment or facilities that will help to stop the transmission of infection.

### PROVIDE

feedback on this module by completing a short Feedback Questionnaire.

If you need more information on any of the topics in this module, please speak to your line manager and/or check the following resources:

- [National Infection Prevention and Control Manual](#)
- [Guidance on Prevention and control of Clostridium difficile infection \(CDI\) in healthcare settings in Scotland](#)
- [Health Protection Scotland \(HPS\) 'Checklists for preventing and controlling CDI'](#)
- [Education on the safe and effective use of antibiotics](#)

&lt; PREV NEXT &gt;

&gt; Topic 3:

Stopping the spread

## Feedback and assessment

Before you start the assessment, we'd like to get your feedback on this module.



Please complete the [Prevention and Control of Infection - Clostridium difficile - Feedback Questionnaire](#).

After you've answered the questionnaire, you must complete the assessment.



Copyright



Alternative formats



Please close this browser window to exit the module and then open the assessment.

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Feedback questionnaire link:

<https://response.questback.com/nhseducationforscotland/sipcep12cdifficile>

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### Alternative formats



This resource may be made available, in full or in summary form, in alternative formats and community languages. Please contact NHS Education for Scotland on 0131 656 3200 or email [altformats@nes.scot.nhs.uk](mailto:altformats@nes.scot.nhs.uk) to discuss how we can best meet your requirements.

Transcriptions of any videos within this resource are available on request.



Please close this browser window to exit the module and then open the assessment.

## Printable learning resource – Completion Record

Learning outcomes:

- Recognise the symptoms of a CDI early
- Recognise patients at risk of a CDI
- Select the correct method of hand hygiene when caring for *C. difficile* patients
- Take appropriate measures to break links in the chain of infection.

Anticipated learning time: 30 minutes

I confirm that I have completed the above module.

Learner name: .....

Learner role and location: .....

Learner signature .....



This resource may be made available, in full or summary form, in alternative formats and community languages. Please contact us on **0131 656 3200** or email **altformats@nes.scot.nhs.uk** to discuss how we can best meet your requirements.



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