Frequently Asked Questions
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Annual report on the surveillance of CDAD in Scotland, December 2007

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Background information

What is *Clostridium difficile*?

Clostridium difficile is a bacterium, which forms heat resistant spores that can survive for long periods in the environment. It is a part of the normal gut bacteria in a small proportion of healthy adults. However in certain circumstances *C. difficile* can also lead to disease. Strains of *C. difficile* that can cause disease produce two toxins, toxin A and toxin B, which cause diarrhoea, inflammation and injury of the lining of the gut.

What is *Clostridium difficile* associated disease?

The term "*Clostridium difficile* associated disease" (CDAD) covers a range of symptoms from mild diarrhoea to severe disease, including colitis (inflammation of the gut wall), the most serious form of which is pseudomembranous colitis (PMC) and toxic megacolon that can result in gut perforation. Severe cases of CDAD can be fatal.

Treatment with some types of antibiotics which disturb the normal bugs in the gut, can lead to overgrowth of *C. difficile*, resulting in either asymptomatic carriage or infection. Although use of antibiotics is the most common cause of CDAD, other treatments that may affect the gut flora such as invasive surgical procedures or some drugs that reduce acid production in the stomach, may be associated with the disease.

Typical clinical signs of CDAD include abdominal cramps, profuse diarrhoea, the passage of mucoid greenish foul-smelling watery stools, low-grade fever and a rise in white cells.

How do you get CDAD?

Every person carries bacteria in their gut, which are important for its normal function. This is called the normal gut flora. *C. difficile* can cause illness when the normal gut flora is disturbed or damaged. This most commonly occurs when antibiotics are used. *C. difficile* is very robust and can survive in the environment as spores for long periods. It is transmitted via faeces (the faecal-oral route), by direct contact between patients, on the hands of healthcare workers or via contact with contaminated surfaces.

Most people develop the infection in hospitals or other healthcare institutions although infections acquired in the community are on the increase. *C. difficile* spores are resistant to heat, alcohol and other disinfectants and may therefore persist for months in the hospital ward environment. It is estimated that up to 3% of healthy adults and about 20 % of hospitalised patients carry *C. difficile*. Both infected patients and healthy carriers are known to be sources of infection.

How do doctors diagnose CDAD?

It is difficult to diagnose *C. difficile* infection on the basis of its symptoms alone, therefore the infection is normally diagnosed by carrying out laboratory testing which shows the presence of the *C. difficile* toxins in the patient's faecal sample.

Who does it affect? Are some people more at risk?

The elderly are most at risk, over 80% of cases reported are over 65. Immuno-compromised patients (people who have poor immunity for some reason) are also at risk. Children under the age of 2 years are not usually affected.

How can it be treated?

C. difficile can be treated with specific antibiotics. There is a risk of relapse in 20-30% of patients and other treatments may be tried, including pro-biotic (good bacteria) treatments, with the aim of re-establishing the balance of bacteria in the gut. Most cases of *C.difficile* diarrhoea make a full recovery. However, elderly patients with other underlying conditions may have a more severe course. Occasionally, infection in these circumstances may be life threatening.

How can individuals prevent the spread of *C. difficile* to others?

If you are infected you can spread the disease to others. However, only people that are hospitalized, particularly those on antibiotics are likely to become ill. In order to reduce the chance of spreading the infection to others it is advisable to wash hands with soap and water, especially after using the restroom and before eating, keeping surfaces in bathrooms, kitchens and other areas clean and cleaning these on a regular basis with household detergents/disinfectants.

How can hospitals prevent the spread of *C. difficile*?

Unfortunately patients with diarrhoea, especially if severe or accompanied by incontinence, may unintentionally spread the infection to other patients, which may lead to outbreaks of *C. difficile* in hospitals. In addition, the ability of this bacterium to form spores enables it to survive for long periods in the environment e.g. on floors, and around toilets. Staff should wear disposable gloves and aprons when caring for infected patients and affected patients may be segregated from others. Rigorous cleaning with warm water and detergent is probably the most effective means of removing spores from the contaminated environment, whilst staff should observe good hand washing practice. Alcohol gels should be used routinely by healthcare staff between treating patients, but only if their hands are not visibly soiled. When hands are visibly soiled, they must always be washed with soap and water first. In an outbreak situation, the Infection Control Team may introduce special measures for staff, patients and visitors to follow.

Why not screen patients for *C. difficile* on admission to hospital?

A proportion of the population carry *C. difficile* in their gut. There is no evidence that these individuals act as a source of infection unless they have CDAD. Testing for toxin may be negative in these circumstances because the numbers of the bug in the gut may be very low and because it does not always produce toxin. There is no evidence that treating asymptomatic carriers with the appropriate antibiotic will remove the organism from the gut. Even the antibiotics used to treat CDAD are known to sometimes cause the infection themselves therefore attempts at eradication could precipitate the onset of the infection. For these reasons it is better to reduce the risk of CDAD by prudent antimicrobial prescribing and good infection control measures.

Are some patients at increased risk for CDAD ?

Yes – the risk for disease increases in patients with the following:

- antibiotic exposure
- gastrointestinal surgery/manipulation
- long length of stay in healthcare settings
- a serious underlying illness
- immunocompromising conditions
- advanced age

Mandatory surveillance of CDAD in Scotland

What is the mandatory surveillance programme?

The mandatory surveillance programme requires all hospitals and healthcare institutions to test patients, aged 65 and over with diarrhoea, for *C. difficile* toxin. Laboratory tests in combination with clinical symptoms are used to diagnose CDAD patients. All diagnostic laboratories in Scotland follow the same protocol for testing and reporting CDAD. All laboratory results are submitted to Health Protection Scotland. This results in a standardized approach to testing and reporting of CDAD across Scotland.

Why has the surveillance programme been started?

CDAD is increasingly recognised as one of the most important healthcare associated infections. A number of aspects classify CDAD as a severe potential threat associated with receiving healthcare. The number of cases reported on a weekly basis has steadily increased in Scotland over the last 10 years. Increasing numbers of outbreaks in hospitals and other healthcare institutions have been observed in Scotland as well as the rest of the UK. Some of these outbreaks have included cases of severe disease and deaths. Mortality rates for all deaths mentioning CDAD as underlying or direct cause of disease have more than doubled from 1999-2004 in England and Wales. Reports indicate that patients whose admission is complicated by CDAD spend 1-3 weeks longer in hospitals than control group patients. Frequent relapses of the disease can contribute to difficulties with the treatment and may cause adverse health effects.

Who runs the CDAD surveillance programme?

HPS runs the surveillance programme with the assistance of hospital staff, in particular from diagnostic microbiology laboratories and infection control teams in hospitals and healthcare institutions across Scotland.

How is the surveillance undertaken?

Laboratories report to HPS on a regular basis all *C. difficile* toxin positive results in persons aged 65 and over. At HPS the laboratory results are scanned for errors, stored in a dedicated database and analysed to generate rates of disease for each health board area in Scotland.

Which patients are included in the surveillance programme?

In the new mandatory surveillance programme all cases of CDAD, aged 65 and over, who have been in contact with the healthcare system are included. In reality this means that all cases (aged 65 and over) are included in the statistics since no efficient system for distinguishing between community and healthcare acquired infections currently exists in Scotland.

Why not include all patients regardless of age?

The surveillance programme monitors disease in those aged 65 and over, which is the group of patients, which are at the highest risk of contracting infections with *C. difficile*.

Whilst CDAD can occur at any age, it becomes more common the older you are. The surveillance programme targets those most at risk in the first instance. Diagnosing children under 15 is problematic since carriage with no clinical disease is common in children, and standard laboratory tests have not been approved for this age group. Furthermore, clinical symptoms in children are not yet well understood.

This does not mean that CDAD is unimportant in younger age groups; patients still need to be managed appropriately regardless of age. HPS will keep the programme under review and extend the inclusion criteria if and when this is appropriate.

What are the objectives of the surveillance programme?

The primary purpose of the surveillance programme is to monitor the number of patients, aged 65 and over, infected with *C. difficile* in relation to the hospital activity in all healthcare institutions in Scotland. The first two years of the surveillance programme will be used to establish baseline data, including seasonal trends, of *C. difficile* infections for all healthboard areas in Scotland.

Once established the programme will be used to identify high-risk areas of infection and monitor the impact of interventions aimed at controlling and reducing the number and risk of acquiring *C. difficile* infections in Scottish hospitals.

A secondary purpose of the surveillance programme is to identify new emerging (bacterial) strains of *C. difficile*. CDAD caused by certain strain types, in particular 027, have been associated with a more severe course of disease, higher mortality and increased transmissibility between persons. Early detection of new emerging hypervirulent strains is essential to control and prevent the spread of such clones. Currently samples from patients with severe disease and/or outbreaks are further investigated by additional laboratory tests (culturing and molecular characterisation by PCR ribotyping).

What does the report tell us?

The report gives baseline data on the number of cases of CDAD and the rates of disease in relation to hospital activity in all healthboard areas of Scotland. Validation studies indicate that there is some degree of over-reporting because of variations in criteria for specimen collection.

What does the report not tell us?

No conclusions can be drawn on whether these figures are better or worse than previous figures released by HPS. Prior to September 2006 reporting was voluntary, not based on agreed criteria and not comprehensive. No conclusions can be drawn about trends or seasonal variation at this stage.

What is the difference between acute and total occupied bed days?

Acute occupied bed days only include figures for acute hospitals, total occupied bed days include additional beds where care of the elderly patients may be treated. The reason for looking at the second figure is that provision of care for patients aged 65 and over can vary widely between hospitals, some have large numbers of care of the elderly (previously geriatric) within the acute sector, others have very few. This can significantly distort the rates if acute bed days are used.

What is the difference between colonisation and infection and what implications do this have for the programme?

Some individuals can carry the organism and be positive for toxin without having symptoms. These patients are considered to be colonized rather than having true infection. Infected patients can have a range of symptoms from diarrhoea to full blown pseudomembranous colitis.

Validation studies suggest that a varying number of colonized patients are included in the programme because the case definition is laboratory based. As a consequence the true rates of CDAD in Scotland are almost certainly lower than reported.

Results of the surveillance report

What is the overall rate of CDAD in Scottish hospitals?

The overall annual rate for Scotland is 1.27 per 1000 total occupied bed days.

Do particular medical specialties have a higher rate?

We cannot answer this question at this stage. The data obtained from the laboratories currently does not allow us to distinguish at medical specialty level. This is something we may look at in the future.

Why do some NHS boards have higher rates than others?

It is not appropriate to compare rates between Health Boards. Variations in case mix, at risk populations and criteria for sending samples all affect the figures. These data should be used to

compare rates within NHS boards over time. Validation studies have shown that over-reporting occurs to different degrees in different hospitals. These data should therefore only be used to compare rates within NHS boards over time and should **not** be used for comparing between NHS boards.

Discussion

Is there any evidence to show that CDAD rates are rising or falling?

This report only shows baseline data. It is too early in the programme to be able to conclude anything on trends or seasonal variation.

Can the results be directly compared to the rest of Europe and the UK?

There are large differences between the surveillance programmes in Europe and Great Britain. In England, Wales and Scotland the surveillance of CDAD is mandatory in defined populations at risk while in most European countries surveillance is based on alert systems (where testing is done if suspicion of disease is found).

The Scottish surveillance programme has been designed along the lines of the HPA CDAD surveillance programme for England, but there are differences between the national protocols. For example is the Scottish surveillance programme the case definition is binary and therefore weighs both clinical symptoms and laboratory test result equally, while the English case definition diagnoses patients only based on laboratory results. Furthermore, the English hospital activity data (the denominators) used to calculate the rates of CDAD are not divided into age groups, whereas the Scottish are divided into patients over and under 65 years of age (or elderly and non-elderly for non-acute hospitals).

The rates that are **best comparable between England, Wales and Scotland** are the rates by **acute occupied bed days**. For statistical comparisons between two countries the average rates of all healthboard or trusts must be used rather than the overall annual rate to allow calculation of statistical confidence intervals.

How do the rates for Scotland compare to those of England?

Results for Scotland are broadly similar to those in the rest of the UK. With all the caveats mentioned above no statistical significant difference was observed between data for England and Scotland.

How do the results compare to previous figures reported for *C. difficile* in Scotland?

The results cannot be compared with previous figures released by HPS because prior to September 2006 laboratory reporting of CDAD was voluntary, without any case definitions or criteria for reporting. There was huge variation between laboratories in what was reported.

Where does the work go from here?

The Mandatory surveillance programme will continue but criteria for testing and reporting are likely to be revised following completion of the validation studies. The information gathered in the surveillance programme will then be used to help inform key interventions to control and reduce CDAD in the Healthcare setting.

HAI Prevention

What can be done to prevent and control CDAD in hospitals?

Current recommendations on how to control and reduce the occurrence and transmission of CDAD includes: 1) restricted and prudent antimicrobial prescribing, 2) high standard infection control including isolation or cohorting of infected patients, good hand hygiene by healthcare staff and others and cleaning of patients' immediate environment, 3) early detection of disease and local real-time surveillance.

A key factor in development of CDAD is treatment with antibiotics; particularly those that have a broad spectrum i.e. can kill many different types of bacteria. Antibiotics are necessary for treating infections so there will always be a risk of developing CDAD. *There will always have to be a balance between the risk of developing CDAD and the risk of not treating an infection adequately* however careful assessment of whether an individual requires an antibiotic, the type of antibiotic needed and the length of treatment needs to be carried out before any antibiotic is started. This will help to reduce the risk.

The NHS in Scotland has already started to address this issue through the Antimicrobial prescribing policy and practice in Scotland: Recommendations for good antimicrobial practice in acute hospitals (2005)

How can a patient or visitor reduce the risk of CDAD?

- Wash hands thoroughly especially when using toilet facilities and before eating.
- Do not bring food or eat at bedside.
- Avoid sitting in hospital beds if you are visiting and
- Wash hands with *water and soap* after physical contact with infected patients.
- If caring for a CDAD patient, wash hands, *using soap and water* after every contact with the patient, furniture, surfaces and equipment, and clean the patients' environment frequently and meticulously.

Where can I get more information on CDAD?

HPS website: http://www.hps.scot.nhs.uk/haiic/sshaip/clostridiumdifficile.aspx

Wikipedia; http://en.wikipedia.org/wiki/Clostridium_difficile

Acronyms

C. difficile	*Clostridium difficile* (sometimes abbreviated "C. diff")
CDAD	*Clostridium difficile* Associated Disease
HAI	Healthcare Associated Infection (previously known as hospital acquired infection and also referred to in other countries as nosocomial infection)
HPA	Health Protection Agency
HPS	Health Protection Scotland