NATIONAL CLINICAL EFFECTIVENESS COMMITTEE

Tús Áite do Shábháilteacht Othar
Patient Safety First

Surveillance, Diagnosis and Management of *Clostridium difficile* Infection in Ireland

National Clinical Guideline No. 3

Summary

An Roinn Sláinte
DEPARTMENT OF HEALTH

June 2014

National Clinical Effectiveness Committee (NCEC)

The National Clinical Effectiveness Committee (NCEC) was established as part of the Patient Safety First Initiative in September 2010. The NCEC's mission is to provide a framework for national endorsement of clinical guidelines and audit to optimise patient and service user care. The NCEC has a remit to establish and implement processes for the prioritisation and quality assurance of clinical guidelines and clinical audit so as to recommend them to the Minister for Health to become part of a suite of National Clinical Guidelines and National Clinical Audit.

National Clinical Guidelines are **"systematically developed statements, based on a thorough evaluation of the evidence, to assist practitioner and service users' decisions about appropriate healthcare for specific clinical circumstances across the entire clinical system".** The implementation of clinical guidelines can improve health outcomes, reduce variation in practice and improve the quality of clinical decisions.

Information on the NCEC and endorsed National Clinical Guidelines are available on the Patient Safety First website at www.patientsafetyfirst.ie, www.health.gov.ie/patient-safety/ncec

Guideline Development Group
This National Clinical Guideline is an update of the 2008 national *Clostridium difficile* guidelines and was developed by the *Clostridium difficile* subcommittee of the Scientific Advisory Committee of the Health Protection Surveillance Centre (HPSC). (Appendix 1)

Disclaimer
The Guideline Development Group's expectation is that healthcare staff will use clinical judgement, medical nursing and clinical knowledge in applying the general principles and recommendations contained in this document. Recommendations may not be appropriate in all circumstances and the decision to adopt specific recommendations should be made by the practitioner taking into account the individual circumstances presented by each patient/resident and available resources. Therapeutic options should be discussed with a clinical microbiologist or infectious disease physician on a case-by-case basis as necessary.

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1 Definition and impact of *Clostridium difficile* Infection (CDI)

1.1 *Clostridium difficile* Infection (CDI)

Clostridium difficile is the leading cause of infectious nosocomial diarrhoea in industrialised countries. The spectrum of *Clostridium difficile* infection (CDI) ranges from mild diarrhoea to potentially fatal colitis. Antibiotics predispose patients/residents to CDI by disturbing the normal colonic microbiota permitting growth of *Clostridium difficile*.

The first national guidelines for the prevention and control of *Clostridium difficile*–associated disease (CDAD) were published in Ireland by the HSE-Health Protection Surveillance Centre (HPSC) in May 2008. Since publication, our understanding of CDI has advanced significantly so there have been new developments in diagnosis and patient management. With the exception of information on *Clostridium difficile* ribotypes, Ireland now has national information on the burden of CDI from both the mandatory (notifiable) and voluntary (enhanced) national surveillance schemes. Accurate, reliable laboratory diagnosis of CDI is a pre-requisite for appropriate patient management, prevention of cross infection and obtaining reliable epidemiological data; however, since 2008 to date, despite numerous publications outlining the problems with current testing algorithms, there is no agreed international consensus or single gold standard reference test.

1.2 Clinical impact of CDI

CDI imposes a considerable burden on patients/residents. Patients/residents with CDI experience considerable morbidity from debilitating and profuse diarrhoea, and are more likely to require additional healthcare interventions (e.g., isolation, additional therapies and procedures) in addition to specific anti-CDI therapy. Patients with CDI are twice as likely to be discharged to a long-term care facility (LTCF) rather than to their home. For those patients who develop serious complications, significant morbidity and additional costs arise from the need for surgery and post-operative care.

1.3 Scope of the National Clinical Guideline

This guideline is intended to be relevant to all healthcare staff involved in the care of patients/residents that may be at risk of or have CDI in acute hospitals, LTFC, other institutions and in primary care nationally. Patients/residents and members of the public will find this guideline of interest as it outlines the general and specific measures required to prevent and control CDI, how patients/residents can play a role in CDI prevention and how the recommendations should be incorporated into quality measures to safeguard the quality of patient/resident care.

This summary version of the National Clinical Guideline in addition to the full version document, which provides more detail on the National Clinical Guideline, are available at www.health.gov.ie/patient-safety/ncec

Further information on *Clostridium difficile* in Ireland is available at: www.hpsc.ie

1.4 Grading of recommendations

The recommendations are followed by a grade. This is a consensus grade agreed by the CDI Guideline Development Group reflecting the strength of the evidence supporting the recommendation, and discussion of the evidence amongst the Guideline Development Group.

The grades used throughout the guideline are as follows:

- **Legal requirement** (e.g., in the case of the notifiable infectious diseases legislation).
- **Grade A** Evidence from a meta-analysis of RCTs, or from at least one RCT.
- **Grade B** Evidence based on one controlled trial without randomisation, a quasi-experimental study, or extrapolated from RCTs.
- **Grade C** Evidence from comparative studies, correlation studies, case-control studies or extrapolated from category A or B.
- **Grade D** Evidence from expert committees, reports or opinions, the clinical experience of respected authorities, and the conclusions of the Guideline Development Group.

2 National Clinical Guideline recommendations

This guideline updates the HPSC 2008 guidelines, acknowledges changes in CDI epidemiology, new developments in diagnostics, new therapeutic approaches and provides audit criteria to support implementation of recommendations.

The recommendations align with two of the three main aims of the national clinical programme for the prevention of healthcare-associated infection and antimicrobial resistance (hand hygiene by all and using antimicrobials wisely/antimicrobial stewardship). These are detailed in the full version National Clinical Guideline, which is available at www.health.gov.ie/patient-safety/ncec

The recommendations are presented with practical guidance to support the delivery of the recommendations.

The following areas have been specifically updated and contain new recommendations from the 2008 guidelines;

- **Essential elements of a CDI prevention and control programme:** New section
- **Prevention of CDI:** Update on 2008 recommendations including incorporation of antimicrobial stewardship recommendations
- **Surveillence:** Update of 2008 recommendations – recommended denominators for LTCF
- **Laboratory diagnosis:** Updated two step laboratory testing recommendations
- **Management of patients/residents with suspected/confirmed CDI:** New sections on management of patients/residents with potentially infectious diarrhoea, management of Glutamase dehydrogenase(GDH)/Nucleic acid amplification test (NAAT) positive: toxin negative patients/residents
- **Treatment of CDI:** Update on patient/resident management, new section on patients/residents with Irritable Bowel Disease (IBD), surgical management of CDI and new drugs/non-pharmacological options
- **Management of outbreaks and clusters:** No change.

Recommendations are divided into eight sections as follows:

Section	Subsection	Recommendation Number
National recommendations	• Designation of an Irish reference laboratory • Establishment of a single national CDI surveillance system • Improvement of access to infection specialists for non-acute services • Management of bed spacing • Newly built inpatient accommodation	1 2 3 4 5
Essential elements of CDI	• Governance structures • Standard Precautions • Standard operating procedures for a positive *Clostridium difficile* result • CDI clusters/outbreak review • CDI testing essentials	6 7 8, 9 10 11,12
Prevention of CDI	• Antimicrobial stewardship • Proton pump inhibitor use • Education for staff and patients • Management of asymptomatic carriers	13,14 15 16,17 18
Surveillance	• Surveillance - when and who • Surveillance in children <2 years • Case definitions	19,21 20 22,23
Laboratory diagnosis	• Who should be tested • Type of specimen to be tested • Repeat testing for CDI • Testing strategy for CDI diagnosis • Susceptibility testing and molecular typing	24 25-27 28-31 32-34 35-38
Management of suspected/ confirmed CDI	• Management of patients/residents with potential CDI • Informing patients/residents that they have CDI • Management of cases of confirmed CDI • Discontinuation of Contact Precautions • Transfer and discharge of patients • Management of patients/residents at home	39,40 41 42-44 45 46-49 50
Treatment of CDI	• Treatment of first CDI episode • Anti-motility agent use • CDI and surgical review • Role of fidaxomicin • Treatment of first CDI recurrence • Treatment of second and subsequent CDI recurrence • Role of probiotics • Managing patients with IBD and CDI • Role of combination antimicrobial/adjuvant therapy in CDI	51-53 54,55 56,57 58 59 60 61 62 63-66
Management of outbreaks and clusters	• Recognising a cluster/potential cluster of CDI • Membership of the Outbreak Control Team • Key implementation measures in an outbreak	67-69 70 71-73

2.1 National recommendations

Recommendations 1-5 are high level national recommendations which have implications across a number of services. Responsiblity for implementation of these recommendations lies at corporate HSE level.

Recommendations 1-3 require a full business case and cost analysis to assess the savings, costs and clinical advantages associated with their implementation in the Irish healthcare system. This will facilitate the most appropriate approach for implementation of these recommendations.

- **Designation of an Irish reference laboratory**

Recommendation 1
An Irish reference laboratory for *Clostridium difficile* should be designated. Pending designation, specimens should be sent to an international reference laboratory. Isolates collected as part of national surveillance should be compared with isolates from other countries to determine evolutionary trends and the emergence of virulent strains. This should occur in conjunction with laboratories abroad and as part of an international laboratories network. **Grade D**

- **Establishment of a single national CDI surveillance system**

Recommendation 2
A single national surveillance system for CDI surveillance should be established. This should incorporate typing and antimicrobial susceptibility data as relevant and be capable of linking with healthcare facility performance management systems. **Grade D**

- **Improvement of access to infection specialists for non-acute services**

Recommendation 3
Non-acute services should have access to infection specialist expertise as appropriate. **Grade D** (For example, a microbiologist and infection control nurses)

- **Management of bed spacing**

Recommendation 4
Bed spacing should be planned and managed in a way that minimises the risk of spread of CDI as outlined by HIQA (2009) *National Standards for the Prevention and Control of Healthcare Associated Infections*.[1] **Grade D**

- **Newly built inpatient accommodation**

Recommendation 5
Newly built acute hospital inpatient accommodation should comprise 100% single rooms with ensuite shower and toilet facilities and clinical hand-washing sink as outlined in the *National Standards for Prevention and Control of Healthcare Associated Infections* (2009) and *Infection Prevention and Control: Building Guidelines for Acute Hospitals in Ireland* (2009) HPSC.[2] **Grade C**

[1] http://www.hiqa.ie/publications/national-standards-safer-better-healthcare
[2] http://www.hpsc.ie/hpsc/A-Z/MicrobiologyAntimicrobialResistance/InfectionControlandHAI/Guidelines/File,3439,en.pdf

2.2 Essential elements of a CDI prevention and control programme

The following are responsible for implementation of **recommendation 6:**
CEO/General Manager of healthcare facility.

- **Governance structures**

Recommendation 6
Healthcare services should ensure that they have strong governance structures with clear accountability, responsibility and authority for:
- The prevention and control of CDI
- Active CDI surveillance and antimicrobial stewardship programmes
- Timely CDI laboratory diagnosis
- Adherence to appropriate infection prevention and control measures
- Timely management of CDI cases as outlined in this guideline. **Grade D**

Practical Guidance
As healthcare facilities develop patient safety statements[3] appropriate HCAI indicators including CDI surveillance data should be incorporated to facilitate timely CDI management.

The following are responsible for implementation of **recommendation 7:**
Healthcare facility Senior Management Team (e.g. CEO, Director of Nursing/Midwifery, Clinical Director and Director of Finance) and all healthcare staff.

- **Standard Precautions**

Recommendation 7
Standard Precautions should be used at all times by all healthcare staff when caring for patients/residents. **Grade B**

Practical Guidance
Standard Precautions are a group of infection prevention and control practices and measures that apply to all patients/residents at all times regardless of suspected, confirmed or presumed infectious status, in any setting in which healthcare is delivered. Standard Precautions include:
1. Occupational Health Programme
2. Patient/resident placement
3. Hand hygiene
4. Personal Protective Equipment (PPE) for staff
5. Patient-care equipment/instruments/devices
6. Environmental decontamination
7. Management of dishes and eating utensils
8. Management of spillages
9. Management of needle stick injuries and blood and body fluid exposure
10. Management of healthcare waste including sharps
11. Management of laundry and linen
12. Respiratory hygiene and cough etiquette
13. Safe injection practice and aseptic technique
14. Infection control practices for special lumbar puncture procedures.

When Standard Precautions are consistently implemented, the risk of transmission of infectious agents to healthcare workers and patients/residents is minimised.

[3] http://www.dohc.ie/publications/pdf/portlaoise_perinatal_deaths.pdf?direct=1

The following are responsible for implementation of **recommendations 8-10:**
Healthcare facility Senior Management Team, Clinical Director, Clinicians, Infection Prevention and Control and Antimicrobial Stewardship Teams.

- **Standard operating procedures for a positive *Clostridium difficile* result**

Recommendation 8
Each healthcare facility should have an up-to-date documented standard operating procedure to be followed in the event of a positive *Clostridium difficile* laboratory result from a patient/resident. **Grade D**

Recommendation 9
- Each healthcare facility should have a system in place to ensure frequent review of positive *Clostridium difficile* results to designate CDI cases in order to ensure prompt identification of potential clustering of CDI cases. **Grade D**

- Once a case is identified, CDI data should be reviewed at ward/unit, directorate and healthcare facility management level on a regular basis, at a minimum of every 4 weeks depending on ward/patient activity and more often in an outbreak situation. This review should be carried out in conjunction with other relevant indicators to include antibiotic consumption data, hand hygiene, environment and equipment decontamination audits. **Grade D**

Practical Guidance
- Appendix 2 summarises tools and indicators that will assist healthcare facilities in the implementation of recommendations 8-10.

- **CDI cluster/outbreak review**

Recommendation 10
- At a minimum, each episode of severe CDI and all CDI cases associated with clusters/outbreaks should have a systems analysis performed by the clinical team in conjunction with the infection prevention and control team, risk management and patient safety and quality teams to identify potential precipitating factors and systems should be put in place to reduce the risk of recurrence. **Grade D**

- All healthcare facilities should formally review their management of clusters/outbreaks as a matter of routine, to identify precipitating factors and systems should be put in place to reduce the risk of recurrence. Learning from these incidents should be shared across healthcare facilities. **Grade D**

Practical Guidance
- System analysis is a retrospective review of a patient safety incident undertaken in order to identify what, how and why it happened. In the case of CDI, this process is to identify potentially preventable predisposing factors and prevent further recurrence of CDI in other patients/residents.

- The term 'system' analysis/investigation has replaced 'root cause' analysis/investigation as there is rarely one 'root cause' for any incident.

- The systems analysis process itself should ideally be led by the consultant caring for the patient with the relevant clinical nurse manager, with the full support of the infection prevention and control team, risk management and patient safety and quality specialists. However, while this process is being established in a healthcare facility, teams will need more support and leadership from relevant experts such as the infection prevention and control team, patient safety and risk management.

The following are responsible for implementation of **recommendation 11:**
Healthcare facility Senior Management Team (e.g. CEO, Director of Nursing/Midwifery, Clinical Director and Director of Finance) and Microbiology Laboratories.

- **CDI testing essentials**

> **Recommendation 11**
> Healthcare facilities should ensure that the frequency of CDI laboratory testing provides for results to be available in a timely basis to ensure appropriate management of patients/residents with *Clostridium difficile*. **Grade D**

The following are responsible for implementation of **recommendation 12:**
Microbiology Laboratories.

> **Recommendation 12**
> All microbiology laboratories should have a standardised CDI specimen testing strategy and testing methodology. Where hospitals are served by laboratories using the same CDI testing algorithm, then inter-hospital comparison is possible. **Grade D**

2.3 Prevention of CDI

2.3.1 What antimicrobial stewardship measures should be implemented as part of a CDI prevention and control programme?

The following are responsible for implementation of **recommendations 13-14:**
Healthcare facility Senior Management Team (e.g. CEO, Director of Nursing/Midwifery, Clinical Director and Director of Finance), Antimicrobial Stewardship Teams, Infection Prevention and Control Team and Clinicians.

> **Recommendation 13**
> All healthcare facilities should have an active antimicrobial stewardship programme as outlined in *Strategy for the Control of Antimicrobial Resistance in Ireland (SARI)* 2009.[4] **Grade B**

Practical Guidance

- Hospitals should implement the core, high-impact, interventions for antimicrobial stewardship as outlined in the *Strategy for the Control of Antimicrobial Resistance in Ireland (SARI) 2009*, with appropriately staffed antimicrobial stewardship teams.

- An active antimicrobial stewardship programme should include local antimicrobial prescribing guidelines, a restrictive antimicrobial list and efforts to minimise the frequency, duration and number of antimicrobial agents prescribed.

- High impact interventions for antimicrobial stewardship include clinical review and direct prescriber feedback, antimicrobial surveillance and audit, restricted availability of antimicrobials and pre-authorisation.

[4] http://www.hpsc.ie/A-Z/MicrobiologyAntimicrobialResistance/StrategyforthecontrolofAntimicrobialResistanceinIrelandSARI/AntibioticStewardship/Publications/File,4116,en.pdf

Recommendation 14
Clinicians should be knowledgeable of intrinsic CDI risk factors prompting increased attention to antimicrobial stewardship and infection prevention and control in 'at-risk' individuals. **Grade C**

Practical Guidance

- Knowledge of intrinsic risk factors should prompt more careful attention to antimicrobial stewardship and infection prevention and control in 'at-risk' individuals. Intrinsic risk factors for CDI include increasing age, severity of underlying disease, co-morbidity, immunosuppression, cognitive and functional impairment.

- Review of potentially modifiable risk factors at an institutional and ward level and in 'at-risk' individuals may reduce the risk of CDI infection. These risk factors include use of antimicrobial agents, length of hospitalisation, use of cancer chemotherapy agents, receipt of gastro-intestinal procedures and surgery, tube-feeding, the use of acid-suppressant medications, laxatives or stool softener use. Environmental risk factors include high *Clostridium difficile* burden on a ward/unit, high frequency of admissions and discharges to LTCF, residence in close or shared quarters, use of shared toilet facilities and limited ability to isolate infected patients/residents.

2.3.2 Do proton pump inhibitors (PPIs) increase the risk of CDI?

The following are responsible for implementation of **recommendation 15:**
Healthcare facility Senior Management Team (e.g. CEO, Director of Nursing/Midwifery, Clinical Director and Director of Finance), Clinicians and Pharmacists.

Recommendation 15
PPIs should only be prescribed where there is a clear indication for their use. **Grade D**

Practical Guidance

- Available data are inadequate to establish a causal relationship between acid suppressant medicines and CDI; however, evidence available from systematic reviews/meta analyses supports a positive association between acid suppression medication and CDI. **Grade C**

2.3.3 Who needs to receive education regarding CDI prevention?

The following are responsible for implementation of **recommendations 16-17:**
Healthcare Facility Senior Management team (e.g. CEO, Director of Nursing/Midwifery, Clinical Director, Director of Finance), Antimicrobial Stewardship Teams, Infection Prevention and Control Team and Clinicians.

Recommendation 16
Staff education and training on infection prevention and control issues with an emphasis on transmission routes is mandatory for all staff and attendance should be monitored by healthcare facility managers. It should be delivered during orientation/induction, with regular updates and be job/role specific. **Grade D**

Recommendation 17
Patients/residents with CDI and their visitors/carers should be given information on CDI and CDI prevention and shown how to carry out hand hygiene. **Grade D**

Practical Guidance

- All persons that enter the room of a patient/resident with CDI should receive education about the clinical features, transmission and epidemiology of CDI.

- Patients/residents prescribed antibiotics by their GP and patients/residents being discharged on antibiotics should receive appropriate information on their antibiotic to include the importance of taking the antibiotic for the correct duration and at the appropriate dose. The Guideline Development Group has drafted a sample information leaflet that may be useful in this regard.[5]

2.3.4 What is the role of asymptomatic carriers in transmission of Clostridium difficile in healthcare facilities?

The following are responsible for implementation of **recommendation 18:**
Healthcare Facility Senior Management team (e.g. CEO, Director of Nursing/Midwifery, Clinical Director, Director of Finance), Antimicrobial Stewardship Teams, Infection Prevention and Control Team and Clinicians.

> **Recommendation 18**
> Routine placement of asymptomatic *Clostridium difficile* carriers into single rooms **Grade D** and treatment of asymptomatic carriers of *Clostridium difficile*, **Grade A**, are NOT recommended.

2.3.5 Are healthcare workers (HCWs) at risk of getting CDI?

Practical Guidance

- The risk to healthy HCWs of acquiring CDI is thought to be low. Adherence to infection prevention and control precautions and good standards of personal hygiene as outlined in this guideline is recommended to minimise the risk of healthy HCWs acquiring CDI.

- There is very little evidence to suggest, and no international guidelines have recommended, that HCWs on antibiotics should not be caring for CDI patients/residents. Rather, it is recommended that HCWs pay careful attention to hand hygiene during and after antibiotic therapy and after contact with any patient with diarrhoea.

[5] http://www.hpsc.ie/hpsc/A-Z/Gastroenteric/Clostridiumdifficile/Factsheets/

2.4 Surveillance

2.4.1 What are the essentials of CDI surveillance?

The following are responsible for implementation of **recommendations 19-23:**
Healthcare facility Senior Management Team (e.g. CEO, Director of Nursing/Midwifery, Clinical Director and Director of Finance), Infection Prevention and Control Team and Public Health Departments.

Recommendation 19
- CDI surveillance should be carried out in all acute hospitals and should not be limited to clusters/outbreaks. **Grade D**
- A threshold incidence that would trigger implementation of additional infection prevention and control interventions should be defined locally. **Grade B**

Recommendation 20
At present, children aged less than two years should continue to be excluded from CDI surveillance. **Grade D**

Recommendation 21
- Each organisation should have an identified person, who is responsible for assigning and notifying CDI cases to the Department of Public Health. **Grade D**

- For cases occurring outside of the hospital setting (community, residential care or nursing home), an agreed clear protocol with defined responsibilities for notifying the Department of Public Health is required. **Grade B**

Recommendation 22
Case definitions for surveillance should not be used for deciding a clinical diagnosis of CDI. **Grade D**

Recommendation 23
Healthcare facilities should collect data on CDI case type (new/recurrent), severity, origin and onset of CDI as outlined in the national enhanced surveillance protocol. **Grade D**

- ***Hospitals:*** For feedback and benchmarking purposes, acute hospital healthcare-associated case rates should be expressed as:

  i. New cases acquired in that hospital-per-reporting time period (e.g. month or quarter) per 1,000 patient admissions and per 10,000 patient-days (or bed-days used),
  ii. New cases acquired in that hospital per number of patients tested for *Clostridium difficile* per reporting time period.

- ***Long-term care facilities (LTCF):*** CDI infection rates in LTCF should be expressed as the number of new CDI cases acquired in that LTCF per 10,000 resident days. The rate may be calculated as follows:

$$\frac{\text{number of new CDI cases acquired in that LTCF}}{\text{number of resident days per reporting period}} \times 10{,}000$$

- ***Community:*** Community-associated case rates should be expressed as cases (new and recurrent/all cases) nationally per 100,000 population per year.

- ***National:*** National rates should be expressed as cases (new and recurrent/all cases) nationally per 100,000 population per year.

Practical Guidance

- Case definitions for CDI surveillance (case type, severity, origin and onset of CDI) are outlined in detail on the HPSC website at http://www.hpsc.ie/A-Z/Gastroenteric/Clostridiumdifficile/CdifficileSurveillance/. The definition of a healthcare facility for surveillance purposes is any acute care, long-term care, long-term acute care, or other facility in which skilled nursing care is provided and patients/residents are admitted at least overnight. This includes hospitals and LTCF (e.g., nursing homes).

- To ensure consistent and accurate local Computerised Infectious Disease Reporting (CIDR) notification and voluntary enhanced surveillance of CDI cases (new and recurrent), the Guideline Development Group recommend that all positive *Clostridium difficile* laboratory results are discussed with the clinician responsible for the patient/resident to ascertain that the patient/resident with the positive laboratory test result for *Clostridium difficile* meets the CDI case definition. **Grade D**

- If the case definition is met, establish whether this is a first positive *Clostridium difficile* test result or whether the patient/resident has previously had a positive *Clostridium difficile* test result. A guide to the type of notification is as follows:
  a. if a first positive result then this is a notifiable new case of CDI
  b. if the patient has previously had a positive result:
     i. more than eight weeks prior and symptoms had resolved then this is a notifiable new case of CDI
     ii. less than eight weeks prior and symptoms had resolved then this is a notifiable recurrent case of CDI
     iii. and symptoms have not resolved then this is a repeat positive specimen from the same CDI episode and is NOT notifiable.

- If the case definition is not met, the laboratory result is not notifiable to the Department of Public Health. **Grade D**

- CDI mortality data in Ireland should be reviewed. In the first instance, this could include retrospective review of CDI as recorded on death notifications. Wherever feasible, consideration could be given to including all-cause mortality following a diagnosis of a hospital-acquired CDI. **Grade C**

2.5 Laboratory diagnosis

2.5.1 Who should be tested for CDI?

The following are responsible for implementation of **recommendation 24:**
Healthcare facility Senior Management Team (e.g. CEO, Director of Nursing/Midwifery, Clinical Director and Director of Finance), Clinicians and Microbiology Laboratories.

Recommendation 24

- Stool testing for *Clostridium difficile* should be requested by clinicians as early as possible on all patients/residents with possible infectious diarrhoea. Waiting to initiate sampling/testing until, for example, three episodes of diarrhoea has occurred is NOT recommended. **Grade D**

- All diarrhoeal specimens (both healthcare-associated and community) should be tested for *Clostridium difficile* irrespective of the physician's request or the location of onset of diarrhoea. **Grade B**

- *Clostridium difficile* toxin testing should be restricted in children aged less than two years. Exceptions may be made at the discretion of the paediatrician/microbiologist/infectious diseases physician, based on local epidemiology data or if there is compelling evidence in an individual case. **Grade C**

2.5.2 What type of specimen should be tested for CDI?

The following are responsible for implementation of **recommendation 25:**
Microbiology Laboratories.

Recommendation 25
- Only diarrhoeal (unformed) stools should be tested for *Clostridium difficile* toxin. **Grade B**
- For optimal laboratory investigation freshly taken samples should be examined. **Grade B**

The following are responsible for implementation of **recommendations 26-27:**
Clinicians.

Recommendation 26
Routine testing of stool from asymptomatic patients/residents is not clinically useful. **Grade D**

Recommendation 27
In the case of ileus and suspicion of CDI, testing of formed stool is acceptable or alternatively a rectal swab may be used. Other diagnostic procedures (e.g., abdominal CT, colonoscopy) may also be required. **Grade D**

2.5.3 When should a repeat test for CDI be performed?

The following are responsible for implementation of **recommendations 28-31:**
Clinicians.

Recommendation 28
Where a negative *Clostridium difficile* laboratory result has previously been obtained, repeat testing is NOT recommended. **Grade B**

Recommendation 29
Once the diagnosis of CDI is confirmed, patients/residents should NOT be re-tested for *Clostridium difficile* toxin when on anti-CDI treatment. **Grade B**

Recommendation 30
A test of cure after treatment is NOT recommended nor is it required prior to transfer/discharge. **Grade D**

Recommendation 31
If recurrence of diarrhoea occurs after a symptom-free interval in a patient/resident with recent CDI, a repeat specimen should be tested for *Clostridium difficile* toxin and other potential causes of diarrhoea excluded. **Grade B**

2.5.4 What is the best testing strategy to diagnose CDI?

The following are responsible for implementation of **recommendations 32-34: Microbiology Laboratories.**

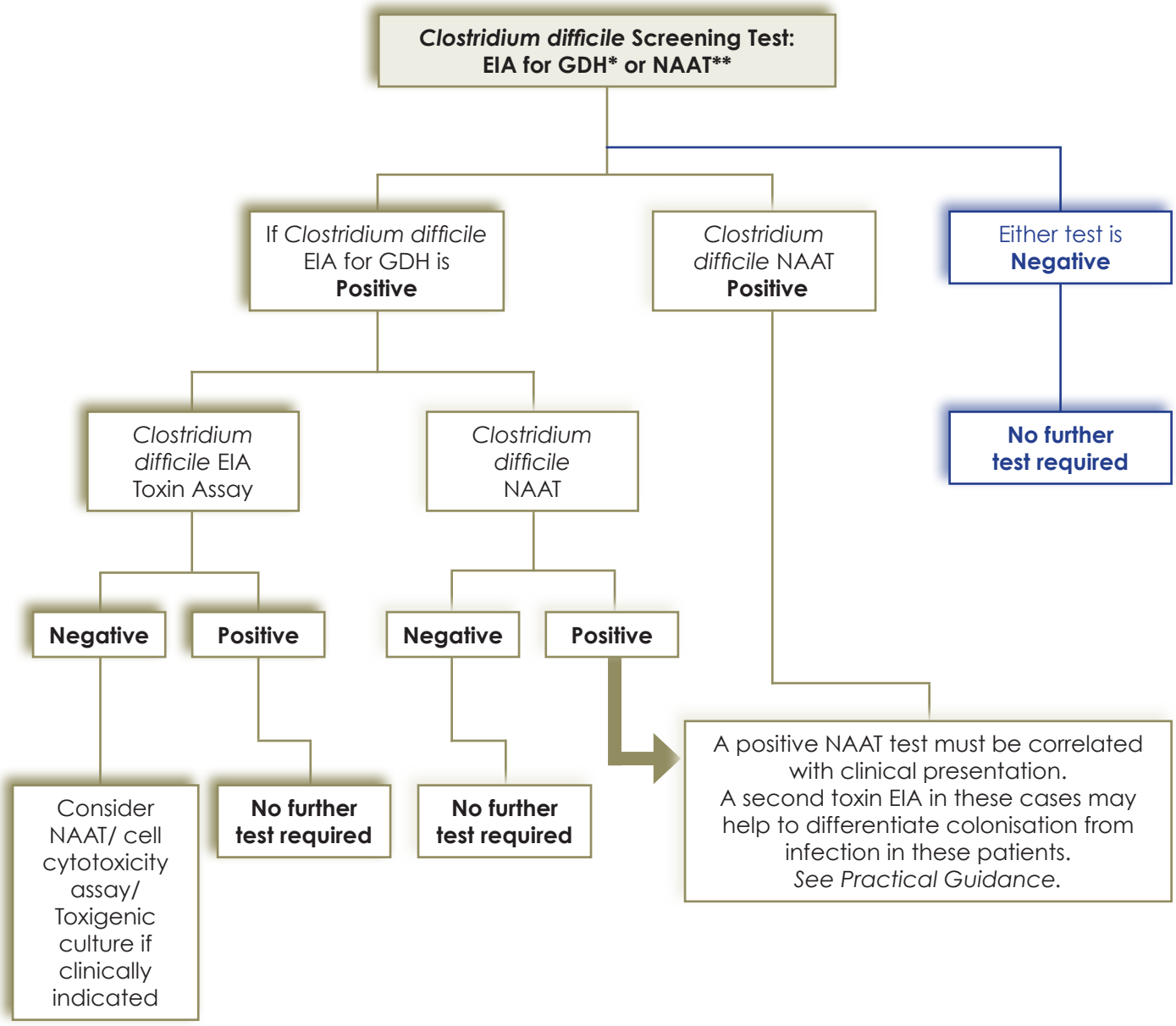
Recommendation 32
Clostridium difficile toxin enzyme immunoassays (EIAs) are not suitable as stand-alone tests for the diagnosis of CDI. **Grade B**

Recommendation 33
- As a screening test, EIA detection of Glutamate dehydrogenase (GDH) or Nucleic acid amplification test (NAAT) may be used. If the screening test (GDH or NAAT) is negative a second test is NOT required. **Grade B**
- If GDH screening test is positive a second test, to detect either toxin (e.g. EIA, cell cytotoxicity assay) or toxin gene assay NAAT, is required. **Grade B**
- Interpretation of positive NAAT results and consideration of the requirement for a second toxin EIA should be correlated with the clinical presentation, **Grade B**, see Figure 1.

Recommendation 34
If the first test is GDH and is positive, and the second test is a toxin EIA and is negative, then NAAT, cell cytotoxicity assay or toxigenic culture should be considered as an additional test. If any of these are positive, then the patient/resident should be considered to be either a carrier of a toxigenic strain of *Clostridium difficile* or a case of CDI depending on clinical assessment (i.e. the presence or absence of symptoms). **Grade B**

Practical Guidance
It is important to recognise that detection of *Clostridium difficile* DNA by NAAT does not confirm that toxin is being produced and therefore positive tests may occur in a patient/resident who does not have CDI. In this instance interpretation of positive NAAT test results should be correlated with the clinical presentation (i.e., the presence or absence of symptoms in the patient/resident). A second toxin EIA in these cases may help to differentiate colonisation from infection in these patients/residents. See Figure 1.

Figure 1 Summary algorithim for *Clostridium difficile* testing



* Enzyme Immune Assay for Glutamate dehydrogenase
** Nucleic acid amplification test

2.5.5 When should specimens be sent for susceptibility testing and molecular typing?

The following are responsible for implementation of **recommendations 35-38:**
Microbiology Laboratories.

Recommendation 35
Frozen storage of small aliquots of all toxin-positive stool specimens is recommended to ensure antimicrobial susceptibility testing can be performed and isolates can be typed retrospectively if required. **Grade D**

Recommendation 36
Specimens should be referred to a reference laboratory for epidemiological typing;
- In cases of severe CDI
- In an outbreak setting
- In a period of increased incidence of CDI: i.e. 2 or more new cases (occurring >48 hours post admission, not relapses) in a 28-day period on a ward/unit
- On a periodic basis nationally in order to monitor the molecular epidemiology of *Clostridium difficile*. It is recommended that 30% of isolates from every laboratory should be typed. **Grade D**

Recommendation 37
Antibiotic susceptibility testing of *Clostridium difficile* should be performed by a specialised (reference) centre. **Grade D**

Recommendation 38
Antibiotic susceptibility testing should be performed on a periodic basis nationally in order to monitor the molecular epidemiology of *Clostridium difficile*. **Grade D**

2.6 Management of patients/residents with suspected/confirmed CDI

2.6.1 How should patients/residents with potentially infectious diarrhoea be managed in a healthcare facility?

The following are responsible for implementation of **recommendation 39:**
Healthcare facility Senior Management Team (e.g. CEO, Director of Nursing/Midwifery, Clinical Director and Director of Finance), Clinicians and Infection Prevention and Control Team.

Recommendation 39
All patients/residents with potentially infectious diarrhoea, i.e. where there is no clear alternative cause for the diarrhoea, should be isolated immediately with Standard and Contact Precautions, i.e. placed in a single room with clinical hand wash sink and ensuite facilities until an infective cause is out-ruled. Placing the patient/resident in isolation should not be delayed while awaiting test results. **Grade D**

Practical Guidance

- The SIGHT mnemonic protocol is a useful aide memoire and should be applied by clinicians (doctors and nurses) when managing patients/residents with suspected potentially infectious diarrhoea (Table 1).
- Patients/residents with suspected potentially infectious diarrhoea should be monitored daily for frequency and severity of diarrhoea using the Bristol Stool Chart.[6]
- All medications should be reviewed by the clinical team and pharmacist (if available) – antibiotics that are no longer clinically indicated should be discontinued. Other medications that may be causing or contributing to diarrhoea should also be reviewed and stopped if safe to do so.

Table 1: SIGHT Mnemonic protocol

S	Suspect that a case may be infective where there is no clear alternative cause for diarrhoea.
I	Isolate the patient/resident. Consult with the infection prevention and control team where available while determining the cause of the diarrhoea.
G	Gloves and aprons must be used for all contacts with the patient/resident and their environment.
H	Hand washing with soap and water should be carried out after each contact with the patient/resident and the patient/resident's environment.
T	Test the stool for *Clostridium difficile* toxin, by sending a specimen immediately.

Adapted with permission from SIGHT Mnemonic UK protocol[7]

2.6.2 What infection prevention and control measures should be taken for patients/residents with diarrhoea who are GDH EIA (or NAAT) positive but Clostridium difficile toxin negative?

The following are responsible for implementation of **recommendation 40:**
Healthcare facility Senior Management Team (e.g. CEO, Director of Nursing/Midwifery, Clinical Director and Director of Finance), Clinicians and Infection Prevention and Control Team.

Recommendation 40
Patients/residents with diarrhoea and a positive GDH EIA (or NAAT) but with a negative toxin should be isolated in a single room with Contact Precautions at the earliest opportunity to reduce the risk of CDI transmission while they are symptomatic with diarrhoea. **Grade C**

2.6.3 Who should inform the patient/resident they have CDI?

The following are responsible for implementation of **recommendation 41:**
Healthcare facility Senior Management Team (e.g. CEO, Director of Nursing/Midwifery, Clinical Director and Director of Finance), Clinicians and Infection Prevention and Control Team.

Recommendation 41
Patients/residents with CDI should be informed by the clinician, clinical team, general practioner or designated senior clinical staff member primarily responsible for their care as soon as the diagnosis is made. Relevant information on preventing transmission of CDI outlining the range and need for appropriate infection prevention and control precautions should be provided (e.g. patient/resident information leaflet) and the patient/resident shown how to carry out hand hygiene. **Grade D**

[6] Lewis SJ, Heaton KW (1997). "Stool form scale as a useful guide to intestinal transit time". *Scand. J. Gastroenterol.* **32** (9): 920–4
[7] HPA Report. Clostridium Difficile Infection. How to deal with the problem. Available at: http://www.hpa.org.uk/webc/hpawebfile/hpaweb_c/1232006607827

2.6.4 How should patients/residents with confirmed CDI be managed in a healthcare facility and how should the environment/equipment be decontaminated?

The following are responsible for implementation of **recommendations 42-43:**
Healthcare facility Senior Management Team (e.g. CEO, Director of Nursing/Midwifery, Clinical Director and Director of Finance), Clinicians and Infection Prevention and Control Team.

Recommendation 42
Any non-CDI antimicrobial therapy should be discontinued as soon as possible. **Grade C**

Recommendation 43
- Contact Precautions should be used in addition to Standard Precautions for the care of all patients/residents with CDI in all healthcare facilities.
- Hand washing should be performed with soap (antimicrobial or non-antimicrobial) and water during patient/resident care according to the World Health Organisation (WHO) 'Five Moments for Hand Hygiene':
  - Before patient contact
  - Before aseptic task
  - After body fluid exposure risk
  - After patient contact
  - After contact with patient surroundings. **Grade A**
- Chlorine-releasing agents 1,000 ppm are recommended as the disinfectant of choice for routine disinfection for CDI. In units with higher rates of endemic CDI or an outbreak setting, higher concentrations may be used and/or use of other sporicidal agents may be considered. **Grade D**

Practical Guidance
- Current international guidelines recommend environmental decontamination (after cleaning) with chlorine-releasing agents at a concentration of at least 1,000 parts per million (ppm) available chlorine (av cl). (Table 2.4 in full version document).
- Contact Precautions for patient/resident with CDI include the following:

Patient/resident isolation
- The patient/resident with CDI should be isolated in a single room with ensuite facilities and a clinical hand wash sink.
- If ensuite facilities are not available, it is essential that the patient/resident with CDI has a dedicated toilet or commode and is not permitted to use the general toilet facilities on the ward/unit.

Hand washing
- Hand washing must be performed with soap (antimicrobial or non-antimicrobial) and water during patient/resident care according to the World Health Organisation (WHO) 'Five Moments for Hand Hygiene'. The physical action of rubbing and rinsing is the only way to remove spores from hands. Alcohol hand rub must not be used as an alternative to soap as *Clostridium difficile* spores are known to be highly resistant to killing by alcohol. It can be applied after washing to rid hands of remaining non-clostridial organisms.
- Patients/residents should be advised and if needed assisted, to wash their hands with soap and water and dry with paper towel after using the bathroom and before eating.

Personal protective equipment (PPE)
PPE (i.e. gloves and aprons) must be donned prior to, and subsequently removed, following each period of care activity for a patient/resident with CDI. Gloves and apron/gown should be worn when entering a room for all interactions that may involve contact with the patient/resident or potentially contaminated areas in the patients/residents' environment. (**Grade A** (gloves), **Grade D** (gowns)). PPE should be readily available to staff for this purpose.

Care equipment and the environment
Care equipment, e.g. blood pressure cuffs, thermometers, hoist slings should be dedicated to a single patient/resident with CDI.

- All care equipment must be cleaned and disinfected immediately after use on a CDI patient/resident. The use of disposable materials should be considered whenever possible.
- Thoroughly clean and disinfect the environment daily paying special attention to frequently touched sites and equipment close to the patient/resident.
- Environmental faecal soiling may be an important source of *Clostridium difficile* spores e.g. toilets and commodes/bedpans, and should be cleaned and disinfected immediately.
- After discharge of a patient/resident with CDI the room and equipment must be cleaned and disinfected thoroughly.

Laundry and Healthcare Risk Waste

- All laundry should be placed into an alginate stitched or water-soluble bag at the bedside. The sealed bag should be placed immediately into a laundry bag according to organisational and national guidelines.
- Linen should be heat-disinfected during the wash process by raising the temperature to either 65°C for not less than 10 minutes, or preferably 71°C for not less than three minutes.
- Disinfection of heat labile materials (according to manufacturer instructions) can be achieved at low temperatures, by introducing 150 ppm of available chlorine into the penultimate rinse.
- Sorting or manually rinsing soiled laundry is not recommended. A sluice cycle should be the first stage of the automated washing process.
- Within a healthcare facility waste soiled with diarrhoea (e.g. incontinence wear and wipes) from a suspected or known CDI patient/resident should be disposed of as healthcare risk waste.

The following are responsible for implementation of **recommendations 44-49:**
Healthcare facility Senior Management Team (e.g. CEO, Director of Nursing/Midwifery, Clinical Director and Director of Finance), Clinicians and Infection Prevention and Control Team.

2.6.5 What can you do if you have no single room available?

Recommendation 44
There should be clear risk assessment protocols to prioritise patients/residents for isolation who are either suspected or confirmed with transmissible infections requiring isolation. Risk assessments should clearly document if patients/residents cannot be placed in a single room due to insufficient single rooms and reported to healthcare senior managers as an infection prevention and control risk. **Grade D**

2.6.6 When can Contact Precautions be discontinued?

Recommendation 45
Contact Precautions should be maintained until the patient/resident has had no diarrhoea for at least 48 hours *and* has had a formed or normal stool for that patient/resident. **Grade D**

2.6.7 When is it safe to transfer patients/residents?

Recommendation 46
For patient/resident transfer to another healthcare facility, if the transfer is not urgent, the receiving healthcare facility should only accept a patient/resident currently being treated for CDI if the patient/resident has had no diarrhoea for at least 48 hours *and* has had a formed or normal stool for that patient/resident. **Grade D**

Recommendation 47
For patient/resident transfer within a healthcare facility, movement should be limited to essential purposes only. **Grade D**

Recommendation 48
Prior to an internal patient/resident transfer (within a healthcare facility), the receiving department should be informed of the patient/resident's CDI status and the need for Contact Precautions. **Grade D**

Recommendation 49
On the patient/resident's discharge, the patient/resident's history of CDI should be included in the discharge letter and communicated clearly to the GP and to healthcare workers who may be taking care of the person. This communication will facilitate appropriate antimicrobial prescribing and reduce the risk of a possible recurrence. **Grade D**

2.6.8 How should patients/residents with confirmed CDI be managed at home?

The following are responsible for implementation of **recommendation 50:**
Healthcare facility Senior Management team (e.g. CEO, Director of Nursing/Midwifery, Clinical Director and Director of Finance), Clinicians, Infection Prevention and Control Team and Public Health Nurses.

Recommendation 50
Patients/residents and their families should receive an information leaflet[8] outlining appropriate precautions that should be taken by the person with CDI and their family. The risk of household contacts acquiring *Clostridium difficile* once a patient/resident has been discharged is considered very low but this risk may be higher for those household contacts receiving antimicrobial therapy. **Grade C**

Practical Guidance
In the home, the following precautions are advised (all **Grade D**):

Hand washing
Hand hygiene is the single most important infection prevention and control measure.
- Carers, including family and healthcare workers if assisting with personal care, should wash their hands thoroughly with soap and water and dry.
- The person with CDI should wash their hands thoroughly with soap and warm water and dry them after using the bathroom, before preparing food and before eating.

Personal protective equipment (PPE)
Disposable gloves and aprons should be worn by healthcare workers when attending to a patient/resident who has diarrhoea. These should be removed and disposed of immediately after the episode of care. Hand hygiene should then be carried out as described above.

Waste and environmental decontamination
- Waste soiled with diarrhoea (e.g. incontinence wear) should be disposed of in a safe manner (i.e. the waste bag should be sealed to ensure that the bag will not leak or that the outside of the bag could become contaminated).
- The person with CDI should be facilitated and encouraged to maintain good personal hygiene standards:
  - Personal items such as towels and face cloths should not be shared.
  - Persons with CDI should avoid using the same toilet as other family members if possible. If this is not possible, after an episode of diarrhoea, the bathroom should be first cleaned with detergent and water and then disinfected with a mixture of bleach and water as instructed on the container. Special attention should be paid to frequently touched sites (e.g. sink taps, flush handle, toilet seats) and the toilet bowl.
- The immediate environment of the person with CDI should be cleaned with detergent and water, paying particular attention to hand contact surfaces (e.g. bedside table, hand rails). If soiled, following cleaning, the area should then be disinfected as above.

[8] http://www.hpsc.ie/hpsc/A-Z/Gastroenteric/Clostridiumdifficile/Factsheets/File,2946,en.pdf

Laundry
- Used laundry should be machine-washed separately from other washing on the hottest wash cycle suitable for linen and clothing.
- Laundry soiled with diarrhoea should first be machine washed using a cold pre-wash cycle and then washed using detergent powder/liquid at the hottest wash cycle tolerated for the clothing.

Community healthcare workers may find *"Infection Prevention and Control - An Information booklet for Home Helps and Personal Assistants"* useful.[9]

2.7 Treatment of CDI

2.7.1 How is the first episode of CDI best treated?

The following are responsible for implementation **of recommendations 51-53: Healthcare Facility Senior Management Team (e.g. CEO, Director of Nursing/Midwifery, Clinical Director and Director of Finance), Infection Prevention and Control Team, Antimicrobial Stewardship team and Clinicians.**

Recommendation 51
Patients/residents with CDI should be reviewed on a daily basis by the medical and nursing team for deterioration, monitoring the frequency and severity of diarrhoea using the Bristol Stool Chart. **Grade D**

Recommendation 52
Patient/resident classification by disease severity as outlined in Figure 2 is recommended for appropriate management. Common elements of severity scores that may be used in patient/resident assessment include leucocytosis, elevated serum creatinine and age over 60 years. **Grade C**

Recommendation 53
Patients/residents with CDI and marked or increasing leucocytosis or other signs of fulminant colitis should undergo prompt CDI management review, to include a surgical assessment. **Grade C**

Practical Guidance
- Treatment of CDI is stratified by disease severity and summarised in Figure 2.
- To date, there are no published validated clinical prediction scores for CDI or a single specific test for severe CDI.

- **Prescribers Notice**
  - Healthcare staff should use clinical judgement, medical and nursing knowledge in applying the guidance in Figure 2 and give due regard to individual circumstances presented by each patient/resident and available resources.
  - Refer to BNF for children or local paediatric formulary for doses of metronidazole and vancomycin for paediatric patients.

[9] http://www.hpsc.ie/hpsc/A-Z/MicrobiologyAntimicrobialResistance/InfectionControlandHAI/Factsheet/

Figure 2: CDI disease severity stratification - general and specific treatment measures for initial episode of CDI and first recurrence[10]

INITIAL EPISODE OF CDI *OR* FIRST RECURRENCE

General Measures:

- Supportive care: Adequate replacement of fluid and electrolytes and attention to nutrition
- Immediately discontinue unnecessary antimicrobial therapy
- Avoid antimotility medications
- Review other risk factors for CDI
- Review indications for proton pump inhibitor use
- Appropriate infection prevention and control to include patient isolation with Contact Precautions and appropriate hand washing
- Systems analysis by clinical team in conjunction with the infection prevention and control team, risk management and patient safety for healthcare-associated CDI

Mild to Moderate CDI:

- No features of severe CDI.

- Oral or nasogastric metronidazole 400 mg TDS for 10 to 14 days. **Grade A**
- Inability to take oral medication: intravenous (IV) metronidazole 500mg TDS for 10 to 14 days. **Grade D**
- Metronidazole intolerance or contraindication: oral vancomycin 125mg QDS for 10 to 14 days. **Grade A**
- Monitor closely for deterioration/progression to severe CDI. **Grade D**

Severe CDI:
(Suggested by any of the following)

- Clinical: fever, rigors, abdominal pain.
- Laboratory: Leucocytosis of ≥15,000 cells/μL, or rise in serum creatinine of ≥50% above baseline or serum creatinine >133 μmol/L).
- Endoscopic findings: pseudo membranous colitis.
- Imaging: CT evidence of colitis or ascites.

- Early surgical opinion. **Grade C**
- Oral vancomycin 125 mg, QDS for 10 to 14 days. **Grade A**

Severe, complicated CDI:
Severe disease with:

- Hypotension
- Shock
- Rising serum lactic acid levels
- Ileus
- Megacolon.

- Early surgical opinion. **Grade C**
- Vancomycin 500 mg, oral or nasogastric QDS *and* metronidazole 500mg, IV TDS. **Grade D**
- Consider Intracolonic vancomycin 500 mg, four to six times daily if ileus present or suspected. **Grade D**

- For initial CDI - oral fidaxomicin 200mg BD for 10 days may be an alternative to metronidazole, **Grade C**, or vancomycin, **Grade A**, in patients aged 16 yrs and older but only following discussion with a clinical microbiologist or infectious diseases consultant.
- Following discussion with a clinical microbiologist or infectious diseases consultant oral fidaxomicin may also be an option in the following situations:
  - In patient/residents at high risk for recurrent CDI. **Grade B**
  - In patient/residents with a first recurrence of CDI. **Grade B**
  - Where concomitant antibiotics need to be used in patient/residents with CDI. **Grade B**

**Fidaxomicin has not been tested in pregnant or breastfeeding women or in patient/residents with a history of inflammatory bowel disease.*

[10] O'Donoghue C, Kyne L. Update on *Clostridium difficile* infection. Curr Opin Gastroenterol 2011 Jan;27(1):38-47.

2.7.2 Can anti-motility agents be used in the treatment of CDI?

The following are responsible for implementation **of recommendations 54-55:**
Healthcare Facility Senior Management Team (e.g. CEO, Director of Nursing/Midwifery, Clinical Director and Director of Finance), Infection Prevention and Control Team, Antimicrobial Stewardship team and Clinicians.

Recommendation 54
Anti-motility agents should be avoided as adjunctive treatment for initial episodes of CDI. **Grade D**

Recommendation 55
Anti-motility agents may play a role in the management of persistent diarrhoea in patients/residents who are stable and not unwell (normal white cell count and absence of abdominal pain or distention) despite more than 20 days treatment for CDI. The potential benefits in these patients/residents include more rapid resolution of diarrhoea and symptom relief for the patient/resident and also a theoretical reduction of environmental contamination with infected stool. **Grade D**

Practical Guidance

- The decision to use anti-motility agents requires a careful risk/benefit assessment taking into account the duration and severity of CDI.
- The potential risks of using anti-motility agents in CDI include obscuring symptoms of CDI and precipitating complications such as ileus or toxic megacolon.

2.7.3 When do you refer a patient/resident with CDI for surgical review?

The following are responsible for implementation **of recommendations 56-57:**
Healthcare Facility Senior Management Team (e.g. CEO, Director of Nursing/Midwifery, Clinical Director and Director of Finance), Infection Prevention and Control Team, Antimicrobial Stewardship team and Clinicians.

Recommendation 56
Patients/residents with severe CDI should be managed by a multidisciplinary team to include a clinical microbiologist and/or infectious diseases physician and a surgeon. Surgical review should be requested at an early stage once severe or severe complicated CDI is clinically suspected as outlined in Figure 2. **Grade C**

Recommendation 57
If the multidisciplinary team agrees that surgery is indicated, at present, subtotal colectomy with an end-ileostomy is the recommended procedure. Segmental resection that risks leaving diseased colon behind is NOT recommended. **Grade C**

Practical Guidance

- The decision that surgical management is required for CDI should be taken by the multidisciplinary team as outlined in the full version National Clinical Guideline document, available at www.health.gov.ie/patient-safety/ncec. Surgery should be considered if there is systemic inflammation and the patient's condition has deteriorated and is not responding to anti-CDI therapy (including toxic megacolon, an acute abdomen and severe ileus).
- Serum lactate may serve as a marker for severity and evidence would suggest that surgery should be performed before lactate exceeds 5.0mmol/L.
- Recently, loop ileostomy and colonic lavage combined with antimicrobial treatment (intra-colonic ante-grade vancomycin and IV metronidazole) has been proposed as an alternative to colectomy in the treatment of severe, complicated CDI, however further studies are required to evaluate this approach.

2.7.4 What is the role of fidaxomicin?

The following are responsible for implementation **of recommendation 58:**
Healthcare Facility Senior Management Team (e.g. CEO, Director of Nursing/Midwifery, Clinical Director and Director of Finance), Infection Prevention and Control Team, Antimicrobial Stewardship team and Clinicians.

Recommendation 58
Following discussion with a clinical microbiologist or consultant in infectious diseases, fidaxomicin may be used in these situations:

- As an alternative to vancomycin for adult patients/residents with mild-moderate or severe CDI. **Grade A**
- In patients/residents at high risk for recurrent CDI. **Grade B**
- With a first recurrence of CDI. **Grade B**
- Where concomitant antibiotics need to be used in patients/residents with CDI. **Grade B**

Practical Guidance

- In the case of CDI due to PCR ribotype 027, fidaxomicin was not associated with fewer CDI recurrences (in contrast to reduced recurrent CDI due to non 027 ribotypes). **Grade B**

- No clinical trials or studies have directly compared the efficacy or safety of fidaxomicin with metronidazole, however expert opinion would consider fidaxomicin to have similar advantages to vancomycin. **Grade C**

2.7.5 Can you predict patients/residents that are more likely to get recurrence?

Practical Guidance

- A clinical prediction rule based on the presence of two or more of the following has been shown in one study to predict recurrence with a diagnostic accuracy of over 71%: age over 65 years, presence of severe or life-threatening underlying disease (Modified Horns Index of 3 or 4) and use of additional (non-CDI) antimicrobials after discontinuation of CDI therapy. **Grade B**

- Of patients/residents treated for CDI, 20% or more of them will have at least one additional episode.

- Risk factors for recurrence are similar to risk factors for initial episodes and include history of previous CDI (more than one recurrence), increased age, co-morbidity (more severe underlying disease and/or renal failure), functional dependency, and continued use of (non-CDI treatment) antimicrobials after CDI diagnosis and/or after CDI treatment.

2.7.6 How do you manage a patient/resident with first recurrence of CDI?

The following are responsible for implementation **of recommendation 59:**
Healthcare Facility Senior Management Team (e.g. CEO, Director of Nursing/Midwifery, Clinical Director and Director of Finance), Infection Prevention and Control Team, Antimicrobial Stewardship team and Clinicians.

Recommendation 59
Treatment of the first recurrence is as for the first episode of CDI, stratified by disease severity as outlined in Figure 2. **Grade D**

Practical Guidance
The first step in managing possible recurrent CDI is to discontinue the precipitating antimicrobial(s) if possible and to confirm CDI by stool testing as outlined in the full version National Clinical Guideline document, available at www.health.gov.ie/patient-safety/ncec. If antimicrobials must be continued for clinical reasons, antimicrobials with a lower propensity to induce CDI should be selected.

2.7.7 *How do you manage second and subsequent recurrences and what do you do if a patient/ resident keeps getting recurrences?*

The following are responsible for implementation **of recommendation 60:**
Healthcare Facility Senior Management Team (e.g. CEO, Director of Nursing/Midwifery, Clinical Director and Director of Finance), Infection Prevention and Control Team, Antimicrobial Stewardship team and Clinicians.

> **Recommendation 60**
> The management of patients/residents with second and subsequent recurrences of CDI is outlined in Figure 3.

Practical Guidance

- Consider supervised trial of anti-motility agents alone if post-infective irritable bowel syndrome is suspected after more than 20 days of anti-*Clostridium difficile* treatment (only if patient/resident has a normal white cell count and no abdominal symptoms or signs of severe CDI).

- **Prescribers Notice**
  - Healthcare staff should use clinical judgement, medical and nursing knowledge in applying the guidance in Figure 3 and give due regard to individual circumstances presented by each patient/ resident and available resources.
  - Refer to BNF for children or local paediatric formulary for doses of metronidazole and vancomycin for paediatric patients.

Figure 3: Management of multiple (second and subsequent) recurrences of CDI

Second and subsequent episodes of recurrent CDI
NOT SEVERE OR SEVERE, COMPLICATED CDI

↓

- Review all antimicrobial therapy, PPI use and other medications. **Grade D**
- Review other risk factors for CDI. **Grade D**
- Ensure adequate fluid and electrolytes and review nutritional status. **Grade D**
- Appropriate infection prevention and control to include patient isolation with Contact Precautions and appropriate hand washing.
- Contact clinical microbiologist or specialist infectious diseases consultant expert for advice.
- Consider the following options after expert advice as above:
  - Oral vancomycin tapering/pulse therapy:
    - 125mg QDS for 7 days
    - 125mg BD for 7 days
    - 125mg OD for 7 days
    - 125mg every other day for 7 days
    - 125mg every 3 days for 7 days. **Grade D**

or

  - Oral fidaxomicin 200mg BD for 10 days. **Grade D**

or

  - Oral vancomycin 125mg QDS for 10 days followed by a course of oral rifaximin 400mg TDS for 20 days. **Grade B**

or

  - Intravenous immunoglobulin therapy 150-400mg/kg per day for 1 to 3 days. **Grade D**

or

  - Faecal microbiota transplantation. **Grade A**

FOR SEVERE OR SEVERE COMPLICATED CDI,
TREAT AS FIRST EPISODE AS OUTLINED IN FIGURE 2.

The following are responsible for implementation **of recommendations 61-66:**
Healthcare Facility Senior Management Team (e.g. CEO, Director of Nursing/Midwifery, Clinical Director and Director of Finance), Infection Prevention and Control Team, Antimicrobial Stewardship team and Clinicians.

2.7.8 Do probiotics play a role in prevention or management of CDI?

Recommendation 61
From current evidence probiotics cannot be recommended for the treatment or prevention of CDI. **Grade C**

2.7.9 How should patients/residents with inflammatory bowel disease (IBD) and confirmed/ suspected CDI be managed?

Recommendation 62
A high clinical suspicion should be maintained for CDI in IBD patients/residents. CDI should be considered in any IBD patient/resident presenting with diarrhoea and abdominal pain, even with a prior colectomy. **Grade D**

Practical Guidance
- CDI in patients/residents with IBD should be managed as outlined in Figures 2 and 3.
- Early advice from an infection specialist (clinical microbiologist/infectious diseases physician) should be sought.

2.7.10 Is there a role for combination antimicrobial therapy/adjuvant therapy in CDI?

Recommendation 63
There is insufficient evidence to support the use of combination antimicrobial therapy in non-severe CDI. **Grade D**

Recommendation 64
Combination therapy with oral or nasogastric vancomycin and intravenous metronidazole is recommended as initial therapy in severe complicated disease. **Grade D**

Recommendation 65
In severe CDI with ileus, use a combination of intracolonic vancomycin and intravenous metronidazole and/or nasogastric vancomycin. **Grade D**

Recommendation 66
There is limited evidence for use of intravenous immunoglobulin as adjuvant therapy in severe or recurrent CDI. **Grade D**

2.8 Management of outbreaks and clusters

2.8.1 How can you recognise a cluster/potential cluster and what should you do next?

The following are responsible for implementation of **recommendations 67-69:**
Specialists in Public Health, healthcare facility Senior Management Team (e.g. CEO, Director of Nursing/Midwifery, Clinical Director and Director of Finance), Infection Prevention and Control Team, Antimicrobial Stewardship Team and Clinicians.

Recommendation 67
Medical practitioners and clinical directors of diagnostic laboratories are required to notify unusual clusters or changing patterns of illness to the Medical Officer of Health (MOH) (who is the local Director of Public Health, or the designated Specialist in Public Health Medicine (SPHM).
Legal requirement.

Recommendation 68
When an outbreak of CDI is suspected, an outbreak control team (OCT) should be established. The decision to convene an OCT will be made by the hospital chief executive or general manager/ network manager or the relevant local community services senior manager, on the advice of: the consultant medical microbiologist and/or the MOH (Local Department of Public Health). **Grade D**
(Suggested members of the OCT are outlined in Recommendation 70).

Recommendation 69
Nursing homes are required to inform the Health Information and Quality Authority (HIQA) of an outbreak within three working days. **Legal requirement**

Practical Guidance

- A cluster/outbreak is defined as the occurrence of two or more epidemiologically linked CDI cases over a defined period, taking account of the background rate or where the observed number of CDI cases exceeds the expected number.
- Each healthcare facility should have a surveillance system in place that enables timely alerts of a change in *Clostridium difficile* incidence that may indicate a possible CDI cluster/outbreak.
- Recognition of a cluster/outbreak needs an alert/trigger mechanism in place with rapid and reliable diagnosis to facilitate early intervention. Use of statistical tools such as statistical process control (SPC) charts may assist to distinguish between natural and unexpected variation and identify when numbers of CDI cases are exceeding normal expectations for that ward. **Grade D**

2.8.2 Who should be on the Outbreak Control Team (OCT) and what is its function?

The following are responsible for implementation of **recommendation 70:**
Specialists in Public Health, healthcare facility Senior Management Team (e.g. CEO, Director of Nursing/Midwifery, Clinical Director and Director of Finance), Infection Prevention and Control Team, Antimicrobial Stewardship Team and Clinicians.

Recommendation 70
All healthcare facilities should ensure that there are documented outbreak management processes and procedures that are reviewed and updated on a regular basis outlining the roles and responsibilities of the OCT members. The OCT should be multi-disciplinary and made up of senior professionals and decision-makers (Table 2). Where an outbreak involves healthcare facilities in more than one area, the composition of the OCT should reflect this and include a Specialist in Public Health Medicine from the HPSC. A decision should be taken at the initial stage as to which area takes the lead role. **Grade D**

Practical Guidance
The role of the OCT is that of an advisory body working with relevant staff members to advise on and co-ordinate the following:

- Epidemiological investigation of the cluster/outbreak and confirmation that a cluster/outbreak has occurred.
- Development of an outbreak control strategy including implementation of control measures and monitoring of their effectiveness.
- Development of an appropriate communications strategy; provision of support, advice and guidance to individuals and the various organisations directly involved in dealing with the outbreak.
- To declare when the outbreak is over and prepare a report to include recommendations for prevention of a further outbreak and dissemination of lessons learnt.

Table 2: Recommended membership of a CDI Outbreak Control Team

	Acute Hospital	Community
Chair	Hospital CEO/manager	Local community services senior manager or Department of Public Health specialist/Medical Officer of Health[1]
Team	Department of Public Health Specialist/Medical Officer of Health[1] (MOH)	Local community services senior manager (if not the chair should be a member of the OCT) or Department of Public Health specialist/Medical Officer of Health[1] (if not the chair should be a member of the OCT)
	Consultant physician/surgeon	Attending medical officer or general practitioner
	Occupational health physician	Occupational health physician (if available)
	Consultant medical microbiologist	Consultant medical microbiologist (if available)
	Infection prevention and control nurse(s)	Infection prevention and control nurse(s) (if available)
	Infectious disease physician	Healthcare facility manager or representative
	Antimicrobial pharmacist	Local pharmacist (as appropriate)
	Surveillance scientist	Surveillance scientist
	Director of nursing	Director of nursing/nurse in charge
	Clinical director(s)	Ward/department nurse manager of affected area(s)
	Ward/Department nurse manager of affected area(s) Chief/Senior laboratory scientist Bed manager Patient services manager/ household services manager Patient representatives office Others as appropriate[2]	Others as appropriate[2]

[1] The Medical Officer of Health will notify the HPSC.
[2] Others that should be included in the process and kept informed include risk management/communications officer(s)

2.8.3 What are the most important measures to implement during an outbreak of CDI?

The following are responsible for implementation of **recommendations 71-73:**
Specialists in Public Health, healthcare facility Senior Management Team (e.g. CEO, Director of Nursing/Midwifery, Clinical Director and Director of Finance), Infection Prevention and Control Team, Antimicrobial Stewardship Team and Clinicians.

Recommendation 71
Control of CDI in outbreaks requires implementation of antimicrobial stewardship and measures to prevent cross infection to other patients/residents. This usually involves infection prevention and control and antimicrobial stewardship measures including early isolation of patients/residents with Contact Precautions, education of staff and patients/residents/visitors, re-enforcement of local antimicrobial prescribing guidelines with avoidance of inappropriate broad-spectrum antimicrobial therapy, increased environmental and equipment cleaning and disinfection and optimising hand hygiene by all. **Grade D**

Recommendation 72
All efforts should be made to prioritise patients/residents with CDI for isolation. Patients/residents with suspected infectious diarrhoea in whom the cause of diarrhoea has not been determined should be isolated in a single room pending diagnosis. If the number of CDI cases exceeds the availability of single rooms for isolation, and risk assessment has confirmed that there is no other option for isolation of patients/residents with CDI, then alternative placement options include:

a. Cohort ward or bay with dedicated nursing staff for the area
b. Isolation/dedicated ward in the event of a large outbreak.

Cohorted patients/residents should be managed by designated staff to minimise the risk of cross infection to other patients/residents. **Grade D**

Recommendation 73
If a large outbreak of diarrhoea occurs such that there are insufficient single rooms for every affected patient/resident, then the ward should be immediately closed to admissions. **Grade D**

3 National Clinical Guideline development process

3.1 Aim of National Clinical Guideline

The purpose of this guideline is to enhance the safety and quality of patient/resident care by reducing healthcare-associated infection, specifically those caused by *Clostridium difficile*, through a series of recommendations that reflect best international practice. Comprehensive implementation of this National Clinical Guideline in all Irish healthcare settings as part of an integrated infection prevention and control and patient safety strategy will ensure that patients/residents with CDI are detected in a timely fashion, managed optimally and that cross infection to other patients/residents is minimised.

Specifically this guideline:

1. Updates the 2008 guidance for the surveillance, diagnosis, prevention and control, and treatment of CDI in Ireland.
2. Provides appropriate audit and other tools for healthcare staff/healthcare facilities to monitor implementation of the recommendations.
3. Complies with the requirements for guidelines published by the Department of Health (DoH) National Clinical Effectiveness Committee in early 2012.

This summary version includes the recommendations. The full version National Clinical Guideline provides more detail, including references, bibliography and appendices and is available at www.health.gov.ie/patient-safety/ncec

The *National Standards for Safer Better Healthcare* (HIQA 2012)[11] provide a strategic approach to improving safety, quality and reliability in our health services. The following are the elements of a CDI control programme to ensure that patient/resident care is reliable, designed to keep patients/residents safe and of high quality in line with the National Standards.

Patient/resident-centred care

- Prevention and control of *Clostridium difficile* is a key priority for all healthcare providers
- Patient/resident information on CDI prevention and control
- Governance and reporting systems to provide assurance
- Implementation of *National Standards for the Prevention and Control of Healthcare Asociated Infections* (HIQA 2009).

Effective care

Systems and controls in place to:

- Monitor outcomes in terms of CDI data
- Monitor compliance with National standards
- Analyse and learn from CDI incidents when they occur – dissemination of learning and institution of controls to prevent recurrence.

Safe care

- Implementation of national CDI, antimicrobial stewardship and hand hygiene guidelines
- Audit and assessment of guideline compliance.

[11] http://www.hiqa.ie/publications/national-standards-safer-better-healthcare

Better health and wellbeing

- Healthcare provider education regarding the prevention of HCAI and Antimicrobral Resistance (AMR) including CDI patient/resident education regarding the prevention of CDI.

3.2 Methodology and literature review

The recommendations update and expand on the previous Irish guidelines, *Surveillance, Diagnosis and Management of Clostridium difficile - Associated Disease* (HPSC 2008), where relevant, and incorporate other international guidelines, relevant published literature and the consensus expert opinion of the Guideline Development Group itself.

The Guideline Development Group first met in October 2011 and met on a number of occasions thereafter up to December 2012, with teleconferencing facilities available to assist those contributing from outside Dublin. The recommendations are divided into eight sections. Draft sections were forwarded to the chair and circulated to the entire committee in advance of each meeting. Details of the literature review are summarised in Appendix 4 of the full version National Clinical Guideline.

The methodology used by the Guideline Development Group for development of the National Clinical Guideline and details of the consultation process is outlined in Section 1.7 and Appendix 5 of the full version National Clinical Guideline. Submissions made during the consultation process were discussed at the group's final meeting in December 2012 and incorporated as appropriate into the final document submitted to the Scientific Advisory Committee (SAC) of the HSE-HPSC in January 2013. The guideline was approved by the SAC, placed on the HPSC website and forwarded to the NCEC in March 2013. After feedback from the NCEC review, the document was revised accordingly. A Guideline Development Group review of the recommendations and the summary document was conducted in January and April 2014.

3.3 Financial impact of CDI

The Guideline Development Group examined the economic impact of CDI which is outlined in detail in the full version National Clinical Guideline document. In addition a budget impact analysis was completed with the support of HIQA.

3.4 External review

The Guideline Development Group was extremely fortunate that two of the world experts in *Clostridium difficile* agreed to review this guideline with no payment or gratuity.

The consultation document was forwarded to Professor Ed Kuijper, Chair, ESCMID study group for *Clostridium difficile* Executive Committee and Department of Medical Microbiology, Leids Universitair Medisch Centrum, Leiden, The Netherlands in October 2012. The Guideline Development Group is very grateful to Dr. Kuijper and appreciate the time commitment that was involved for him to review the entire consultation document.

Professor Ciarán P. Kelly, Beth Israel Deaconess Medical Center and Harvard Medical School, Boston, USA, reviewed recommendations 51-66, treatment of CDI in December 2012 after redrafting following the consultation process.

The Guideline Development Group wishes to thank both Professor Kuiper and Professor Kelly for their generosity in sharing their expertise and giving of their time so freely.

3.5 Procedure for update of guideline

The Guideline Development Group is a subcommittee of Scientific Advisory Committee (SAC) of the HSE-HPSC. It was agreed by the SAC in October 2008 that the SAC will review its publications on a three-yearly basis and update as appropriate. Therefore, this National Clinical Guideline will be reviewed again in 2017.

3.6 Implementation of guideline

For full implementation of this National Clinical Guideline, it is essential that all healthcare staff understand and appreciate that they are responsible for the prevention and control of HCAI which includes CDI in all areas of their responsibility. This must be supported by clear lines of accountability which include systems that can detect and correct lapses in infection prevention and control practice on a timely basis and increases in CDI incidence as outlined in this guideline. Patients/residents can also play a role, expecting the highest standards of healthcare quality and safety and ensuring that healthcare facilities assure them that there is an effective CDI control programme in place.

3.7 Roles and responsibilities

Each healthcare staff member has a role to play in the prevention and control of HCAI, which includes CDI by adhering to best practice as outlined in this guideline. This National Clinical Guideline should be reviewed by the healthcare facilities senior management teams in conjunction with the relevant specialists to plan implementation of the recommendations. This will enable the facility to ensure that the prevention and control of CDI is a key patient/resident safety issue for the facility.

3.7.1 Organisational responsibility

Within each healthcare facility the CEO/General Manager has corporate responsibility for implementation of the National Clinical Guideline.

3.7.2 All healthcare staff

All healthcare staff should:

- Comply with this National Clinical Guideline and related policies, procedures and protocols
- Adhere to their code of conduct and scope of practice guidelines as appropriate to their role and responsibilities
- Maintain competency in the prevention and control of CDI
- In using this guideline be aware of the role of appropriate delegation.

3.8 Audit criteria

To ensure that this guideline positively impacts on patient care, it is important that implementation is audited. Audit is recommended to support continuous quality improvement in relation to the implementation of the National Clinical Guideline.

The following are examples of audit criteria which are consistent with HIQA *National Standards for the Prevention and Control of Healthcare Associated Infections* (2009):

3.8.1 Number of new cases of CDI acquired in the healthcare facility per reporting time period (e.g., month or quarter)
- Hospitals: per 1,000 patient admissions and per 10,000 patient days (or bed days used)
- Long-term care facilities: per 10,000 resident days

3.8.2 Antimicrobial consumption data
- Hospital antimicrobial consumption (Defined daily doses/100 bed days used)
- Antimicrobial use audits assessing compliance with local antimicrobial prescribing guidelines

3.8.3 Hand hygiene compliance score (%)
- Overall and per each of the WHO 5 moments of hand hygiene
- By staff group
- By ward or unit

3.8.4 Compliance with Contact Precautions
- Number of observed patient care episodes in which contact precautions are appropriately implemented/number of observed patient care episodes in which contact precautions are indicated x 100

3.8.5 Compliance with environmental and patient care equipment cleaning/disinfection
This can include:
- Hygiene audit scores
- Patient care equipment decontamination audit
- Sluice room audit.

Appendix 1
Guideline Development Group

Terms of Reference: To update the 2008 national guidelines; *Surveillance, Diagnosis and Management of Clostridium difficile* (HPSC 2008).

Membership: Full details of membership including contributions, affiliations, representative bodies and conflicts of interest are outlined in the full version National Clinical Guideline.

Chair: Dr Fidelma Fitzpatrick (FF), Consultant Microbiologist, of the HPSC and Beaumont Hospital

Members:

- Dr. Karen Burns (KB), Consultant Microbiologist, HPSC and Beaumont Hospital
- Dr. Susan Clarke (SC), Infectious Disease Physician, St. James' Hospital
- Ms. Annette Darcy, Surveillance Scientist, Letterkenny General Hospital
- Ms. Breda Deasy (BD), Infection Prevention and Control Clinical Nurse Specialist, St. Luke's General Hospital, Kilkenny (IPS)
- Dr. Anne Dee (AD), Specialist in Public Health Medicine, HSE Midwest, Limerick
- Dr. Lynda Fenelon (LFe), Consultant Microbiologist, St. Vincent's University Hospital
- Ms. Sarah Foley (SF), Antimicrobial Pharmacist, Beaumont Hospital
- Ms. Liz Forde (LFo), Infection Prevention and Control Clinical Nurse Specialist, Cork Community Infection Prevention and Control Services, HSE-South
- Dr. Patrick Gavin (PG), Consultant in Paediatric Infectious Diseases, The Children's University Hospital, Temple Street and Our Lady's Hospital, Crumlin
- Dr. Anne Gilleece (AG), Consultant Microbiologist, Connolly Hospital
- Dr. Lorraine Kyne (LK), Consultant in Medicine for the Elderly, Mater Misercordiae Hospital
- Mr. Stephen Murchan (SM), Surveillance Scientist, HPSC
- Dr. Sinéad Mc Dermott (SD), Specialist Registrar, Clinical Microbiology
- Mr. Stephen Mc Mahon(SMcM), Irish Patients Association
- Prof. Deirdre Mc Namara (DM), Associate Professor and Consultant Gastroenterologist, Adelaide and Meath Hospital, Trinity College Dublin.
- Ms. Sinéad Morrissey (SM), Practice Development Facilitator, Nursing Homes Ireland
- Dr. Coilín ÓhAiseadha (CO), Specialist Registrar in Public Health Medicine, Dept. of Public Health, HSE Limerick
- Ms. Grainne O'Reilly(GR), Medical Scientist, Mater Misericordiae University Hospital
- Dr. Jennifer O'Hanlon (JH), Specialist Registrar in Public Health Medicine
- Dr. Fiona Roche, Surveillance Scientist, HPSC (joined December 2012)
- Mr. Damodar Solanki (DS), Chief Pharmacist, Beaumont Hospital

Additional Contributions and Review

- Management of CDI in Primary Care: FF, Dr. Nuala O Connor, Dr. Maria O Mahony, ICGP
- Figure 3: Dr Katie McFaul, SpR in Infectious Diseases, St. James Hospital
- Full version National Clinical Guideline - Section 2.3.5: Dr Blanaid Hayes, Consultant in Occupational Health Medicine, Beaumont Hospital
- Full version National Clinical Guideline - Section 2.7.3: Mr. Eadhbhard Mulligan, Consultant Surgeon, Connolly Hospital
- Full version National Clinical Guideline - Section 2.7.9: Dr. Barry Hall, Inflammatory Bowel Disease Fellow, Department of Clinical Medicine, AMNCH
- Full version National Clinical Guideline - Appendix 8: Dr. Suzanne Corcoran, Consultant Microbiologist, Bons Secours Hospital, Dublin

Appendix 2
Summary of tools to assist implementation of National Clinical Guideline

Relevant links available at:
http://www.hpsc.ie/hpsc/A-Z/Gastroenteric/Clostridiumdifficile/Publications/

Management of patients/residents with suspected/confirmed CDI (healthcare facilities and primary care)

- Patient/resident information leaflet
- CDI management and treatment algorithms;
  - Management of CDI in Primary Care
  - First episode and first recurrence of CDI
  - Second and subsequent recurrences.

Management of patients/residents with suspected/confirmed CDI (healthcare facilities)

- Infection prevention and control precautions (Contact Precautions)
- Guidance (risk assessment) for decision makers on isolation. Appendix 6, page 55 of the *Management of Multidrug-Resistant Organisms in Healthcare Settings (MDRO) Guidelines*
- Sample care plan for patients/residents with CDI
- Sample daily check list for sluice room and equipment
- Sample systems analysis tool for healthcare facility-associated CDI

Prevention of CDI, clusters and outbreaks in healthcare facilities

- Sample patient information leaflet for patients/residents prescribed an antibiotic course
- Infection prevention and control precautions - Standard and Contact Precautions
- Bristol Stool Chart
- CDI surveillance protocol
- CDI case definitions
- Calculation of resident days for CDI surveillance in long-term care facilities
- Hand hygiene audit tool
- National antimicrobial stewardship guidelines
- Sample CDI trigger tool

Key performance indicators for the prevention and control of CDI

1. **Number of new cases of CDI acquired in the healthcare facility per reporting time period (e.g.,month or quarter)**
   - Hospitals: per 1,000 patient admissions and per 10,000 patient days (or bed days used)
   - Long-term care facilities: per 10,000 resident days
2. **Hospital antibiotic consumption (Defined daily doses/100 bed days used)**
3. **Hand hygiene compliance score (%)**
   - Overall and per each of the WHO 5 moments
   - By staff group
   - By ward or unit

Appendix 3
Glossary of terms and abbreviations

Definitions within the context of this document

Healthcare facility	Any acute care, long-term care, long-term acute care, or other facility in which skilled nursing care is provided and patients are admitted at least overnight.
Healthcare staff	Includes medical doctors, nurses, healthcare assistants, biomedical scientists, pharmacists, allied health and social care professionals and healthcare management.
Clinician	A healthcare professional such as a doctor or nurse involved in clinical practice.
Infection prevention and control team	A group of people from within and outside the service, with complementary knowledge and skills relating to infection prevention and control. The structure of the team should be based on current accepted best practice. Below is an example of an Infection Prevention and Control team and is for guidance purposes only: • Consultant clinical microbiologist • Infectious disease consultant • Infection prevention and control nurse specialist • Surveillance scientist/medical scientist • Antimicrobial pharmacist • Occupational health physician.

Abbreviations

AFPL:	Amplified Fragment Length Polymorphism
AIG:	Acute Infectious Gastroenteritis
AMR:	Antimicrobial resistance
BD:	Bis In Die/twice daily
BNF:	British National Formulary
CCFA:	Cefoxitin Cycloserine Fructose Agar
CCTA:	cell cytotoxicity assay
CDAD:	*Clostridium difficile* associated disease
CDI:	*Clostridium difficile* infection
CDRN:	*Clostridium difficile* ribotyping network
CIDR:	Computerised Infectious Disease Reporting
CIR:	Crude incidence rate
CME:	Continuing medical education
CPE:	Cytopathic effect
DoH:	Department of Health
DRG:	Diagnosis related group
EIA:	Enzyme immunoassay
ESCMID:	European Society for Clinical Microbiology and Infectious Diseases
ESRI:	The Economic and Social Research Institute
ECDC:	European Centre for Disease Prevention and Control
ESGCD:	European Society for Clinical Microbiology and Infectious Diseases Study Group for *Clostridium difficile*
GDH:	Glutamate dehydrogenase
GP:	General practitioner
HCW:	Healthcare worker/healthcare staff
HCAI:	Healthcare associated infection
HPA:	Health Protection Agency
HPSC:	Health Protection Surveillance Centre
HIQA:	Health Information and Quality Authority
HIPE:	Hospital In-Patient Enquiry
HSE:	Health Services Executive
IBD:	Inflammatory bowel disease
IDSA:	Infectious Disease Society of America
ICU:	Intensive care unit
IPC(T):	Infection prevention and control (team)
LOS:	Length of stay
LTCF:	Long-term care facility
MIC:	Minimum inhibitory concentration
MLST:	Multi Locus Sequence Typing
MLVA:	Multilocus Variable-Number Tandem-Repeat Analysis
MOH:	Medical Officer of Health
MRSA:	Meticillin resistant *Staphylococcus aureus*
NAAT:	Nucleic acid amplification tests
NCPE:	National Centre for Pharmacoeconomics
NICE:	National Institute for Health and Clinical Excellence
NHS:	National Health Service
OD:	Once daily
OCT:	Outbreak control team

PCR:	Polymerase chain reaction
PPM:	Parts per million
PFGE:	Pulsed Field Gel Electrophoresis
PPE:	Personal Protective Equipment
PPIs:	Proton pump inhibitors
PPV:	Positive predictive value
QDS:	Quater Die Sumendus/four times daily
RCT:	Randomised controlled trial
REA:	Restriction Endonuclease Analysis
SAC:	Scientific advisory committee
SAPG:	Scottish Antimicrobial Prescribing Group
SD:	Standard deviation
SHEA:	Society for Healthcare Epidemiology of America
slpAST:	Surface layer protein A gene sequence typing
SPHM:	Specialist in Public Health Medicine
SPC:	Statistical Process Control
TDS:	Ter Die Sumendum/three times daily
UCL:	Upper control limit
US:	United States
UK:	United Kingdom
WHO:	World Health Organisation

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