# Management and Control of Carbapenemase-producing Enterobacterales (CPE) in all Health and Social care Settings

## HSE AMRIC

## National Guidance Document

## Version 1.1 September 29th 2025

# Contents

## Glossary of terms

| Term | Definition |
|---|---|
| **Antimicrobial** | An antimicrobial is a medicine used to prevent and treat infections in humans, animals, and plants. Antimicrobials include antibacterials, antivirals, antifungals, and antiparasitics. In this document, antimicrobial primarily refers to antibacterial agents, although the principles of stewardship also apply to antivirals, antifungals and antiparasitics. |
| **Cohorting** | Cohorting refers to accommodation of two or more patients in a space that they share with each other, but which is separate from space used by other patients |
| **Carbapenems** | A class of broad-spectrum antibiotics generally used to treat multidrug resistant infection. They include meropenem, ertapenem and imipenem. |
| **Colonisation** | Colonisation, in the context of CPE, refers to a situation in which a microorganism is established on a person's body (for example in the gut) but is not causing infection at that time. Although the person who is colonised is not infected, the organism may spread from a colonised person to others and/ or subsequently cause infection in the colonised person. |
| **CPE** | Carbapenemase-producing Enterobacterales are Enterobacterales that carry a carbapenemase enzyme. These enzymes destroy carbapenem antibiotics making the antibiotic inactive.<br><br>The following, in alphabetical order, are the five more common carbapenemase enzymes. There are other less commonly seen carbapenemase enzymes:<br><br>**IMP**: Imipenemase<br><br>**KPC**: Klebsiella pneumoniae carbapenemase<br><br>**NDM**: New Delhi metallo-beta-lactamase<br><br>**OXA**: Oxacillinase-type carbapenemase (OXA-48 is the most common variant in Ireland)<br><br>**VIM**: Verona integron-encoded metallo-beta-lactamase |
| **CRE** | Carbapenem-resistant Enterobacterales are Enterobacterales that are resistant to many antibiotics, including carbapenems, making them more difficult to treat if they cause an infection.<br><br>CRE and CPE may occasionally be used interchangeably, however there are important differences. CRE develop resistance to carbapenems through various resistance mechanisms (which may include one or more |

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| | carbapenemases) whereas CPE are Enterobacterales that carry a carbapenemase enzyme. |
| **Enterobacterales** | Enterobacterales (previously known as Enterobacteriaceae) is an order of bacteria commonly found in the human digestive tract. There are several species of bacteria within the Enterobacterales order, which include, but are not limited to, *Escherichia, Klebsiella, Enterobacter, Salmonella, Shigella, Citrobacter* and *Yersinia*. |
| **Isolation** | Isolation refers to accommodation of one patient in a single room ideally with dedicated toilet facilities (toilet / ensuite) and the application of a series of specific infection prevention and control measures to reduce the risk of transmission of specific microorganism from the person in the room. |
| **Patients/ service users'** | Any recipient of health and social care services.<br><br>For the purposes of this guidance, the terms patient / service user includes patients, service users, residents, clients etc. |
| **Health and care worker** | A health and care worker is an individual who works in a community or health care facility setting and is mainly engaged in actions with the primary intent of enhancing health. This includes health service providers, such as doctors, nursing and midwifery professionals, public health professionals, technicians (laboratory, health, medical and non-medical), personal care workers, healers and practitioners of traditional medicine. It also includes health management and support workers, such as cleaners, drivers, hospital administrators, district health managers, social workers, and other occupational groups in health-related activities. This group includes those who work in acute care facilities and long-term care, public health, community-based care and other occupations in the health and social care sectors. Health and care workers may provide direct personal care services in the<br><br>home, in health care and residential settings, while assisting with the routine tasks of daily life and also performing a variety of other tasks of a simple and routine nature (WHO 2024) |
| **Residential care facilities (RCF)** | Residential care facilities (RCF) describe any facility where a person resides. This includes public and private nursing homes, long and short stay beds, Mental Health Commission approved centres, residential settings provided to people with a disability etc. |

## List of abbreviations

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| **AMR** | antimicrobial resistance |
| **AMRIC** | antimicrobial resistance and infection control |
| **AMS** | antimicrobial stewardship |
| **CPE** | Carbapenemase-producing Enterobacterales |
| **CRE** | Carbapenem-resistant Enterobacterales |
| **DPH** | Department of Public Health |
| **ED** | Emergency department |
| **ESBL** | Extended-spectrum beta-lactamase |
| **EUCAST** | European committee on antimicrobial susceptibility testing |
| **GP** | General practitioner |
| **HCAI** | Healthcare associated infection |
| **H&CW** | Health and care worker |
| **HSE** | Health service executive |
| **iNAP** | Irish national action plan for antimicrobial resistance |
| **IPC** | infection prevention and control |
| **IPCT** | Infection prevention and control team |
| **OCT** | Outbreak control team |
| **RCF** | Residential care facility |
| **MOH** | The Medical Officer of Health (MOH) has the responsibility and authority to investigate and control notifiable infectious diseases and outbreaks, under the Health Acts 1947 and 1953; Infectious Disease Regulations 1981 and subsequent amendments to these regulations. |
| **MRSA** | Methicillin-resistant *Staphylococcus aureus* |
| **MDRO** | Multi drug-resistant organisms |
| **NCEC** | National Clinical Effectiveness Committee |
| **NCG** | National Clinical Guideline |
| **NCPERLS** | National carbapenemase-producing Enterobacterales reference laboratory service |
| **Notifiable disease** | A disease that, when diagnosed, requires health providers to report its occurrence to MOH/ DPH in line with Infectious Diseases Regulations 1981 and subsequent amendments to these regulations |
| **PCRA** | Point of care risk assessment |
| **Person/ People** | The terms person/ people are generally used in this document and are in general interchangeable with the terms client, service user or patient |
| **Primary care** | Primary care includes all of the health or social care services that you can find in your community, outside of hospital. It includes GPs, Public Health Nurses and a range of other services. |
| **RCF** | Residential care facility |
| **PPE** | Personal protective equipment |
| **TBP** | Transmission based precautions |
| **UTI** | Urinary tract infection |
| **WHO** | World Health Organization |

| Summary of key changes | |
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| **Patient screening** | Facilities **must** adopt either universal or risk-based (targeted) admission screening, both of which are valid screening strategies in acute healthcare settings. The decision on which type of approach to adopt for patient screening on admission and at other times should be guided by a risk assessment which includes local and regional CPE prevalence, consideration of specific patient populations and risk factors.<br><br>A patient screening program must be implemented alongside infection prevention and control interventions.<br><br>Inclusion of a table as a guide to assist with CPE screening approaches for patients that meet the "**RISK**" criteria – (Table 1). |
| **Risk assessment** | Application of local risk assessment for the management of CPE in various healthcare facilities |
| **Surveillance** | Surveillance systems are needed to rapidly identify patients either colonised or infected with CPE, and where necessary (as guided by risk assessment), their contacts and to monitor trends of colonisation / infection |
| **Management of CPE contacts** | Experience in some Irish healthcare settings suggests that the conversion rate of patients identified as CPE contacts may be low. Therefore, the routine identification of contacts of sporadic CPE cases is no longer recommended.<br><br>Risk assessment is required to determine CPE contacts in the case of an outbreak. Risk assess individuals to determine if they should be considered as CPE contacts. Interval for testing CPE contacts (during an outbreak) to be at least weekly but depending on risk assessment and feasibility this may need to be more frequent. |
| **Environment** | Emphasis on risk mitigation<br><br>Decision to collect and process targeted environmental screening should be risk assessed and only carried out under the direction and supervision of the IPCT |
| **Screening to determine clearance of CPE colonisation / infection** | Reduction from 4 to only 3 negative CPE screens over 12 months since last positive CPE sample to designate a patient as CPE cleared.<br><br>Inclusion of a table to guide screening and management of patients previously identified as CPE colonised.<br><br>Addition of a table with recommendations on screening and management of known CPE positive patients on readmission (Table 2) |

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| **Removal of specific sections and specialist areas from previous guidance** | Emphasis on standard approach and actions as determined by risk assessment, local epidemiology etc. |
| **Outbreaks** | The outbreak section contains signposting to content in the NCG No. 30, such as Table 20, Outbreak investigation and management, and provides details on core elements required to manage an outbreak |
| **Standard precautions and contact precautions (as appropriate)** | Emphasis on a consistent application of standard precautions for all patients at all times with additional contact precautions as required to reduce the spread and transmission of CPE.<br>Signposting to material and relevant sections in NCG No. 30 |
| **Cleaning and disinfection** | Emphasis on consistent application of cleaning processes as a standard and signposting to relevant sections in NCG No. 30 |
| **Antimicrobial stewardship (AMS)** | The section on antimicrobial stewardship has been shortened with links to relevant guidance resources and materials. |
| **Laboratory methods** | Recommendation that each laboratory should have a robust standard operating procedure for detection and characterisation of CPE in diagnostic and screening samples. Refer samples to the National CPE reference laboratory service as necessary/ in line with National CPE reference laboratory service referral processes |
| **Appendices** | Removal of appendices from previous version.<br>Addition of the following appendices:<br>• Sample line listing headings<br>• Examples of high-touch items and surfaces in the health care environment<br>• Risk assessment where access to single room with dedicated toilet facilities is limited<br>• Risk assessment tool for non-acute settings<br>• Sample outbreak report template (adapt as required)<br>• Revised checklist for CPE outbreak/ endemic management and control |

## Key recommendations

### For all healthcare settings

- Approaches to manage a person who is colonised or infected with CPE may differ in different healthcare settings and are addressed in relevant sections of this guidance
- Consistent implementation of standard and contact precautions to reduce the risk of spread of CPE in all healthcare areas
- Consistent and effective, cleaning processes are necessary and in advance of disinfection. Enhanced cleaning and disinfection may be required to reduce risk of CPE transmission
- Antimicrobial stewardship is pivotal. Antimicrobial stewardship committees should review audits on antimicrobials. Action should be taken where there is early recognition of increased antimicrobial consumption trends, including broad spectrum antimicrobials and carbapenems
- Prompt response is necessary to detect and manage outbreaks or clusters of CPE to minimise onward transmission
- Management of CPE environmental contamination, in particular where water is used and disposed of, can reduce transmission of CPE to patients
- Management of the built environment can reduce transmission of CPE to patients
- Consideration of design elements of new building works and upgrades to existing builds to support infection prevention and control best practices
- The use of risk assessment processes to assist in management of CPE patients in acute and non-acute settings
- Organisational leadership is integral to supporting effective IPC /AMS programmes across healthcare settings.

### Non-acute settings

- A local risk assessment should guide decision making to determine if a person colonised or infected with CPE is at high risk of transmission of CPE. This risk assessment will support appropriate patient placement and management. In a shared care environment, a CPE carrier who is not at high risk of spreading CPE to others does not need to be isolated and should be allowed to use communal facilities (in non-acute settings). Patients at high risk of transmitting to others, for example

those with uncontrolled faecal or urinary incontinence, should be accommodated in a single room with en-suite facilities if possible.

Where there is suspected transmission in non-acute settings, contact local infection prevention control teams for help and support with risk assessments for CPE control and management and notify Department of Public Health in line with obligations to notify outbreaks of infection.

**Acute settings**

- Active patient screening for CPE is recommended to identify CPE positive patients and minimise onward transmission. Facilities **must** adopt either universal or risk-based (targeted) admission screening, both of which are valid screening strategies in acute healthcare settings.
- The decision on which type of approach to adopt for patient screening on admission and at other times in the patient pathway should be guided by a risk assessment which includes local and regional CPE prevalence, consideration of specific patient populations and risk factors. This should be implemented in conjunction with other IPC/ AMS interventions.
- Ensure the use of a local laboratory standard operating procedure (SOP) for the detection of CPE on screening samples which takes into account local laboratory capabilities and testing requirements
- Prompt response to manage outbreaks or clusters of CPE to minimise onwards transmission. Environmental sampling may be appropriate when epidemiologically indicated
- Use of a line listing may be helpful for acute hospitals to support CPE case data management and collection for relevant information in a consistent fashion. Refer to Appendix 1 for a line listing suggested headings
- This guidance incorporates key recommendations and useful resources from the following documents:
  - Department of Health (2023) NCG National Clinical Guideline No. 30 Infection Prevention and Control, available at: http://health.gov.ie/national-patient-safety-office/ncec/
  - European Centre for Disease Prevention and Control. Carbapenem-resistant Enterobacterales, third update –3 February 2025. ECDC: Stockholm; 2025

- UK Health Security Agency (UKHSA), Framework of actions to contain carbapenemase-producing Enterobacterales September 2022
- Antimicrobial Resistance and Healthcare Associated Infection (ARHAI), Toolkit for the early detection, management and control of carbapenemase-producing Enterobacteriaceae in Scottish acute settings, NHS NATIONAL Services Scotland June 2022
- Framework for Action to contain carbapenemase-producing *Enterobacteriacae* (CPE) - application in rehabilitation, British Society of rehabilitation Medicine 2021
- Australian Commission on Safety and Quality in Health Care, Recommendations for the control of carbapenemase-producing Enterobacterales (CPE), A guide for acute care health service organisations, November 2021.

# Context and background

**Rationale for update**

In December 2022, all the existing CPE related guidance was consolidated into one document for ease of use. It is recognised that the national landscape of CPE has since evolved and therefore it is timely to conduct a review of the existing national and international evidence and experiences of management of CPE in Irish healthcare settings. This HSE AMRIC CPE guidance document has been updated to reflect the current situation and experience in Ireland following review and consultation with key stakeholders and it incorporates relevant international guidance and recommendations.

It is recognised that both the requirements for containment of CPE and different approaches to management will vary across different settings and patient populations. These guidelines set out the minimum requirements recommended for the early detection, management and control of CPE. Local IPC teams may choose to extend beyond the minimum recommendations aligned to this guidance, based on their own local risk assessment. HSE AMRIC recognise that the evidence base for some recommendations is limited, and that local risk assessment is important for healthcare facilities bearing in mind relevance to each local situation.

Within the guidance, many of the recommendations have an evidence base and each of these have been referred to explicitly; other recommendations are based on expert guidance or opinion.

## Scope of this guidance

This guidance is intended for health and care workers where health and social care is provided. It replaces the previous consolidated CPE guidance published in December 2022. For additional guidance please go to www.hse.ie/hcai and www.hpsc.ie

This guidance does not include advice on the management of multi-drug resistant non-Enterobacterales pathogens, carbapenem-resistant Enterobacterales with non-carbapenemase resistance mechanisms, non- Enterobacterales carbapenemase-producing organisms (CPO), or other multi-drug resistant organisms (MDROs).

Local risk assessment is important taking into consideration the local situation, experience and epidemiology in the context of implementing this guidance and should be used in association with the National Clinical Guidance No. 30 Infection Prevention and Control, which is available at the following link: www.gov.ie/IPCclinicalguideline.

The 2017 National Standards for the Prevention and Control of Healthcare associated infections in acute healthcare services and the 2019 National Standards for Infection Prevention and Control in Community Services are key reference documents that should be considered in association with these guidelines.

This guidance on CPE reflects that healthcare facilities manage generic IPC risks such as transmission risks for other multi-drug resistant organisms and therefore similar prevention strategies for each, which align to the national clinical guideline, should be adopted. Similarly, a generic practical approach rather than bespoke nuances for specific units, or particular patient cohorts or different types of healthcare facilities and settings has been used for this guidance.

The fundamental principles of basic IPC remain key parts of the defences we have for protecting patients, our colleagues and ourselves. Consistent application of IPC/ AMS measures can reduce the spread of CPE. This guidance therefore supports health and care workers with useful and pragmatic resources to support the

implementation and monitoring of interventions to prevent and control the spread of CPE.

# Overview of Carbapenemase-producing Enterobacterales (CPE) in Ireland

## Introduction

Carbapenem resistance in Enterobacterales, such as *Klebsiella pneumoniae* and *Escherichia coli*, poses a significant threat to patients and healthcare systems in European Union/ European Economic Area (EU/EEA) countries (ECDC 2025).

Antimicrobial resistance is a major challenge to healthcare delivery in Ireland and throughout the world. Control of antimicrobial resistance is grounded in improved use of antimicrobial agents (antimicrobial stewardship) and prevention of the spread of antimicrobial resistant organisms (IPC). Managing transmission of antimicrobial resistant bacteria particularly in the acute hospital setting is very challenging with several competing demands placed on the system. This document is intended to support all healthcare facilities in focusing on those IPC measures likely to be most effective in controlling the spread of CPE.

It is important to note that, as with all IPC practice, measures to manage the risk of transmission must be adapted to take account of the needs of individual patients, for example those with behaviours that challenge, dementia and in those approaching end of life.

### Epidemiology of Carbapenemase-producing Enterobacterales (CPE) in Ireland

CPE was first reported in Ireland in 2009 and was classified a notifiable infection in 2011. At that time, a voluntary enhanced surveillance scheme for CPE was established. In 2012 the National CPE Reference Laboratory Service was established. The Minister for Health declared a national public health emergency on CPE in October 2017, which spurred improved CPE surveillance and reporting of CPE in acute hospitals. The voluntary surveillance scheme was ended and replaced with a mandatory CPE enhanced surveillance scheme in which all microbiological laboratories are required to report information on newly detected CPE cases (from screening and diagnostic specimens, including colonisation, non-invasive and invasive infections) to the Health Protection Surveillance Centre (HPSC).

Furthermore, all acute HSE hospitals are required to report on CPE indicators to the HSE Business Information Unit (BIU) monthly.

In general, isolates from diagnostic samples may reflect clinical infection. Diagnostic samples are collected from a specific site (e.g. urine, wound, blood, etc.) usually, but not always, based on a clinical suspicion of infection. Isolates from surveillance samples, typically rectal swabs, reflect detection of asymptomatic gut colonisation with CPE in the absence of clinical CPE infection. Detection of most cases of CPE in surveillance samples, as is currently the case in Ireland, reflects a system in which most people with CPE are detected relatively early in their contact with the healthcare system allowing early application of measures to control spread.

There has been an increase in newly detected CPE cases in acute hospital settings in each year since 2022, (from 872 cases in 2022 to 1509 cases in 2024, source: BIU), and efforts to reduce transmission continue.

**Changing epidemiology**

The epidemiology of CPE in terms of pathogens and resistance mechanisms has changed over time and continues to evolve. Currently most newly detected CPE cases in Ireland are OXA-48. Other types detected include KPC, NDM, and VIM.

Monthly surveillance reports on CPE are available on the www.hpsc.ie website.

**Challenges with CPE**

CPE are not a homogenous group, but a diverse group of bacteria which may carry different types of carbapenemases. The more common categories of carbapenemase enzymes, in alphabetical order, are IMP, KPC, OXA-48, NDM and VIM as listed in the glossary of terms, page 4.

IMP NDM and VIM are metallo-beta-lactamases. Although treatment options are limited for all CPE, the treatment options are frequently even more limited for metallo-beta-lactamase-producing Enterobacterales.

It is important in the context of managing these patients, particularly in acute hospital settings, that cohorting patients who are colonised with different categories of CPE must be avoided to prevent cross transmission of different carbapenemase enzymes between patients.

**Endemic CPE in Acute Hospitals**

While some acute hospitals in Ireland have experienced occasional or more frequent outbreaks of CPE transmission, others instead experience persistent CPE acquisition amongst inpatients, rather than more defined outbreaks. Many hospitals continue to have persistent environmental reservoirs of CPE in the built environment. While there is a need for continuing to focus on measures to manage the risk of CPE transmission, in many cases this may be better characterised as an endemic problem that needs ongoing management rather than as an outbreak.

CPE acquisition in an acute hospital may be considered to have transitioned from outbreak to an endemic state when the following criteria are met:

1. The outbreak was declared more than 12 months previously
2. The hospital has implemented a screening strategy aligned with the national guidance
3. The incidence of CPE acquisition has been essentially stable for 6 months or more in the context of implementation of all practical measures to interrupt transmission

Details on outbreak management are contained in the outbreak section.

**Actions if CPE has become endemic in your hospital**

When it is recognised that CPE acquisition in the hospital meets the criteria for being described as endemic, in consultation with the IPC team and Public Health an outbreak may be declared over.

The ongoing management of the risk of CPE acquisition should transition to the IPC risk management processes that apply within the hospital to other AMR bacteria and healthcare associated infections.

**What are key considerations for managing endemic CPE?**

For these purposes, each type of CPE enzyme (for example OXA-48, OXA-181, KPC-2, KPC-3, NDM) should be considered separately, but different species of Enterobacterales (i.e., *E.coli*, *Klebsiella* spp etc) carrying the same type of CPE enzyme do not need to be considered separately as the transmission of resistance mechanisms via plasmids or mobile genetic elements between different organisms

can occur. This means that an OXA-48 producing *E.coli* from one patient may be related to an OXA-48 producing *Klebsiella pneumoniae* from another patient.

After a transition to endemic status, if the hospital identifies an atypical cluster or pattern of cases of acquisition of CPE, emergence of a new type of CPE enzyme, for example, KPC detection in an OXA-48 endemic area, it is appropriate to declare a new outbreak. A local IPC risk assessment for changes in the outbreak/ endemic status should be discussed and documented through local IPC/ AMS committee, governance structures and with Public Health. Further discussion or advice can be sought from the AMRIC leads where further engagement is required.

## Importance of controlling CPE

### Organisational responsibilities for all settings

For IPC/ AMS to be effective at the clinical level, organisational support is needed (NCG No.30, 2023). Effective IPC/ AMS governance is essential to meet a healthcare organisation's responsibility to provide a safe environment for patients to receive healthcare, a safe work environment and safe systems of work for healthcare workers. Management and clinical governance can have a positive impact on the effectiveness of IPC/ AMS by driving continuous quality improvement. It is important that healthcare managers and clinicians collaborate effectively, involving those who use healthcare services to effect change and achieve the best possible outcomes.

**Organisational support includes a number of features that are described below.**

Embedding IPC/ AMS in governance and management structures: managers should be aware of the healthcare facility's performance in terms of HCAI and AMR and ensure there are systems in place to prevent the transmission of microorganisms and development of infection, to reduce the risk of infection and AMR and to address problems when they arise. The management structure and processes associated with IPC/ AMS and AMR will differ depending on the size of the organisation and the types of healthcare services it delivers. However, the principles of clinical governance apply regardless of the setting, and all essential roles and responsibilities should be fulfilled. The person in charge of the organisation must have overall responsibility for and direct involvement in the organisation's IPC/ AMS programme.

Ensuring adequate IPC/ AMS resources proportionate to the scale and complexity of the service, for example in acute hospitals and comparable services, requires dedicated IPC staff. In non-acute settings there should be a named person with dedicated time and responsibility to lead an IPC programme within the facility.

Commitment and coordination, along with robust planning and preparation will ensure all staff are enabled to deliver care in a way that protects patients from the risk of colonisation or infection with CPE.

Maintaining awareness of CPE amongst staff can be a challenge, particularly for providers with no or low numbers of CPE cases. However, implementing systems for

ongoing staff education and training on IPC principles and practice, both at induction and during in-service sessions, helps support staff to maintain a work environment that is safe for those who use healthcare services, for themselves and for their colleagues.

Infection prevention and control should be incorporated into planning for facility design and maintenance, aligned to the NCG IPC No 30 Volume 1. Available at: http://health.gov.ie/national-patient-safety-office/ncec/ see section 3.11 Influence of facility design on healthcare associated infection and AMRIC Guidance on Infection Control Guiding Principles for Buildings Acute Hospitals and Community Health and Social Care Settings available at www.hpsc.ie .

Organisational support should aim to ensure that clinical work practices provide person centred care both from a safety and quality perspective and considering the preferences of people who use healthcare services.
Control of resistant organisms is both a national and local problem and requires that facilities that share patients across acute and non-acute settings, where care is provided in each of the health regions and beyond, work together to prevent transmission.

The following is recommended to ensure local governance arrangements are in place:

- Ensure the appropriate management and governance arrangements for each area are in place including oversight at each Health Region
- Develop and implement a CPE prevention and control plan in line with local governance structures and present data at the Infection Prevention and Control/ AMS Committee and / or related governance structures/ committees, with oversight at each Health Region
- Ensure that there is clear reporting of CPE data at a local level and oversight of screening data which is received nationally from each HSE acute hospital via the BIU data / performance cycle monthly.

Further advice and detail on responsibilities can be found in the NCG IPC No 30 Volume 1. Available at: http://health.gov.ie/national-patient-safety-office/ncec/ see section 3.6 Management and clinical governance.

**Risk assessment**

IPC risk management is a constant process and where care is provided, services should constantly monitor and review their IPC risks and ensure that controls are put in place to mitigate against these risks. This process protects the people we care for, staff, and visitors and ensure continuity of service delivery.

Risk assessment process is comprised of 3 steps.

1. Risk identification – a risk is something that may happen that could impact on the delivery of clean safe care
2. Risk analysis – a process that is used to gain a better understanding of the risk identified and the level of risk associated with it. Assessing the level of associated risk takes account of controls in place to mitigate the risk
3. Risk evaluation – this is a process to determine if the level of risk is acceptable. If the risk is not acceptable it is essential to consider how to treat the risk. Risk treatment is the process of selecting and implementing measures to modify the risk

   A risk assessment should be undertaken with supporting control measures to mitigate against cross transmission risk where care is provided. Several supporting risk assessment tools are available in Appendix 3 and Appendix 4 to support this process.

   Refer to NCG IPC No 30 Volume 2: section 7.7.10 Risk-management: Case study for management of confirmed case of Carbapenemase Producing Enterobacterales (CPE).

## Infection Prevention and Control (IPC)

### Standard Precautions

Successful IPC/ AMS involves implementing work practices that reduce the risk of transmission of microorganisms through a two-tiered approach, including standard and contact precautions.

Standard precautions refer to those work practices that are applied to everyone, regardless of their perceived or confirmed infectious status. Standard precautions ensure a basic level of IPC. Implementing standard precautions as a first-line approach to IPC where healthcare is provided minimises the risk of transmission from person to person, even in high-risk situations.

Every effort should be made to limit the potential transmission of CPE and other multi drug resistant organisms, including hand hygiene in line with the WHO 5 moments for staff and assisting patients to perform hand hygiene which may include the provision of hand wipes for patients, as appropriate, after using the toilet and before eating.

Particular attention should be paid to cleaning of high touch surfaces (see Appendix 2 for examples of high touch surfaces) and the frequency of cleaning toilet facilities.

For detail on the individual elements of standard precautions refer to Volume 1, sections 2.1.5 and 3.1 in NCG IPC No 30the NCG National Clinical Guideline No. 30 Infection Prevention and Control Volume 1, available at: http://health.gov.ie/national-patient-safety-office/ncec/

### Contact precautions

Contact precautions are recommended as additional work practices in situations where standard precautions alone may be insufficient to prevent transmission. This includes the use of contact precautions in the event of an outbreak to assist in containing the outbreak and preventing further transmission or infection.

When a person is known to have infection or colonisation with CPE, staff should be particularly careful with respect to their practice of standard precautions and contact precautions as required, and use of PPE as determined by a point of care risk assessment. In settings where there is very limited direct physical contact with the person or their environment there is no requirement for the healthcare worker to

wear personal protective equipment. Examples include brief social contact such as shaking hands.

A suite of AMRIC infection prevention and control training and education resources are available on HSeLanD. Please click on underlined text for link for the link to HSeLanD resources which can be accessed via the AMRIC Hub at https://www.Hseland.ie

For detail on the individual elements of transmission-based precautions, as relevant, refer to the following sections in the NCG IPC No 30 available at: http://health.gov.ie/national-patient-safety-office/ncec/

- Volume 1, section 3.2 Transmission-based precautions
- Volume 1, section 3.4 Management of multi drug resistant organisms (MDRO) and outbreak situations
- Volume 2 section 6.2.5 Recommendations: 11-14 Contact precautions
- Volume 2 section 6.2.7 Recommendation 20 Multidrug resistant microorganisms
- Volume 2 section 7.4 Type and duration of precautions for specific infections and conditions (table 44)

**Use of personal protective equipment**

It is the responsibility of every H&CW to undertake a point of care risk assessment (PCRA), as part of standard precautions, prior to performing a clinical care task; this will inform the level of IPC precautions needed, including hand hygiene, appropriate choice and use of personal protective equipment (PPE), and appropriate patient placement.

For advice on the selection of PPE refer to NCG IPC No 30 guidelines, http://health.gov.ie/national-patient-safety-office/ncec/ see Volume 1 section 3.3 Personal Protective Equipment (PPE) and Volume 2 Table 42 page 250: Use of personal protective equipment for standard and transmission based precautions.

A guide on the appropriate choice of personal protective equipment (PPE) using a point of care risk assessment (PCRA); this is available in the poster section on the HPSC website: https://www.hpsc.ie/a-z/microbiologyantimicrobialresistance/infectioncontrolandhai/posters/

## Guiding principles for patients/ clients colonised with CPE

People colonised or infected with CPE have the same right to access health and social care as everyone else and should not experience significant delays in transfers in either direction between residential care facilities, non-acute care facilities and hospitals due to CPE status and it should not diminish their access to appropriate care in a facility that meets their needs.

People who use healthcare services are entitled to expect that the healthcare service will take care to protect them to the greatest extent practical from the risk of acquiring CPE while using healthcare services.

### Patient placement (isolation)

Placing people that are colonised or infected with MDROs in single rooms, cohort rooms or cohort areas as a component of a multifaceted IPC policy can reduce acquisition rates and infection with MDROs in acute care settings. When people are cared for using contact precautions due to infection or colonisation with an MDRO, they must continue to receive an equal standard of care to those without an MDRO. Vigilance is needed to prevent potential psychological adverse effects of isolation such as anxiety and depression and the feeling of being stigmatised. For further advice refer to NCG IPC No 30, Patient placement (isolation), page 121, Volume 1.

Refer to the other following guidance documents to support decision making:

- HSE AMRIC Guideline: Guide to prioritisation of patients for single room isolation when there are not sufficient single rooms for all patients that require Isolation, available at: www.hpsc.ie
- V3.0 Guidance on Balancing Competing Demands in Relation to Restrictions on Bed Use Related to Infection Prevention and Control in Acute Hospital settings available at www.hpsc.ie
- A sample risk assessment where access to single room with dedicated toilet facilities is limited is available in Appendix 3.

### CPE colonisation

#### What is a CPE case/ CPE colonisation?

A CPE case is a patient from whom CPE has been detected in a clinical specimen (infection or colonisation).

Note that detection of CPE from any site is a notifiable disease. Refer to https://www.hpsc.ie/notifiablediseases/notifyinginfectiousdiseases/ for details of notifiable diseases.

A person who carries CPE in the gut but who has no clinical symptoms or illness related to the CPE is said to be colonised. People may also have asymptomatic CPE colonisation of urine, leg ulcers or indwelling devices.

CPE in the gut do not cause diarrhoea, vomiting or abdominal pain. In a small number of people with gut colonisation, the CPE may cause cystitis, pyelonephritis or sepsis.

Within the acute hospital setting, a patient is considered a suspected CPE case when an isolate that is likely to be CPE has been detected but laboratory confirmation is not complete. Confirmation of an isolate as CPE should generally be available within 2 to 3 hours; rapid methods such as lateral flow and molecular methods should be deployed where available, to support rapid characterisation of suspect CPE. There may be exceptional situations however, with unusual types of CPE where confirmation may be delayed. If there is delay in confirmation, the precautions that apply to a CPE case should apply, pending a definitive laboratory report.

## CPE Screening in an acute setting

Screening for CPE generally means testing a rectal swab or sample of faeces for CPE by selective culture or by molecular methods. Screening consists of a rectal swab or a stool specimen (if a rectal swab is not feasible or acceptable).

Detection of asymptomatic colonisation with CPE is of benefit to the person identified as colonised because that knowledge may be critical to the choice of appropriate empirical antimicrobial treatment in the event that they develop serious infection. In general people colonised with CPE (no clinical evidence of infection) should not be treated with antibiotics.

Detection of asymptomatic colonisation with CPE is of benefit to the wider community because it supports measures to control the spread of CPE in the acute hospital setting.

The following are critical issues in relation to the ethical conduct of a programme of screening for CPE:

- Respect for the person's entitlement to refuse testing without prejudice to their access to care.
- Respect for the entitlement of people identified as colonised with CPE to have the same regard for their privacy and the same level of access to health and social care services as are other people.
- Respect for the person's right to information about their health. In the event that a person tests positive for CPE, they should be informed promptly in accordance with recommendations as outlined in the communication section of this guidance

**The quality of the sample**

The quality of the diagnostic or CPE screening specimen will influence the likelihood of recovery of CPE from that specimen and in turn the validity of the test results. If an initial sample is not of good quality, a subsequent correctly taken specimen that tests positive for CPE may appear to be a newly acquired CPE associated with the specific hospital.

Verbal consent for collection of a rectal swab should be obtained prior to sample collection. A rectal swab is a specimen taken by gently inserting a swab inside the rectum 3-4cms beyond the anal sphincter, rotating gently and removing. Normal saline can be used to moisten the swab prior to insertion. The swab should have visible faecal material and/ or discoloration to enable organism detection in the laboratory.

Testing of people for colonisation with CPE is performed on the basis that people are entitled to decline testing and to the greatest extent practical should be provided with relevant information about the testing offered. A patient information leaflet, about laboratory tests including those taken for surveillance purposes is available on the following link: https://bit.ly/4dL62z0

Robust screening processes in acute healthcare settings support early identification of patients who are colonised with CPE. Combining CPE screening with good adherence to core IPC practices will have a larger impact on limiting CPE transmission than either of these strategies alone.

There are various possible approaches to CPE screening, with local policies informed by guidelines, epidemiology and resources. The WHO and the ECDC recommend risk factor- based screening. In Australia and the UK, screening approaches based on CPE epidemiology are advised. Universal admission screening may detect more CPE carriers earlier, thus reducing their exposure to other patients, and may be a pragmatic approach in some acute settings. However, such an approach would not be viable where there is a low CPE prevalence and/ or available resources are limited.

It is recommended that admission screening for CPE is conducted in acute hospital settings, using either targeted (risk based) or universal approaches. Screening for patients at other times should be based on local epidemiology and experience of transmission in that setting.

At present, acute hospitals perform CPE population screening through either targeted/ (risk based) screening or broad screening approaches for admitted patients. Screening approaches in model 4 hospitals are approximately equally divided between universal admission screening and risk-based admission screening; the approach in model 3 hospitals is predominantly risk-based admission screening.

Table 1 is a guide to support decisions about whom to screen for CPE in acute hospitals.

Further advice on screening during an outbreak/ cluster is contained in the outbreak section.

# Table 1

Admission screening is recommended and should be either **targeted** (risk based) or **universal** (for all patients who will have an overnight stay in hospital). The swab / sample should be submitted within 24 hours of the patient presenting to the hospital / or in accordance with agreed protocol via local governance.

**The RISK criteria for CPE can be a helpful method to identify patients to include in a risk-based screening approach**

| Scenario | Timing of screening | Considerations |
|---|---|---|
| **R** Recent exposure to antibiotics | Admission | Patients with repeated or significant exposure to broad spectrum antibiotics should be considered for screening on admission (where feasible to access this data) |
| **I** In the last 12 months | Admission | Patients who:<br>• Were admitted as an inpatient to any hospital, in Ireland or abroad*<br>• Have had multiple hospital treatments in Ireland or abroad e.g. haemodialysis or receiving cancer chemotherapy<br>• Have had hospital or clinic treatments/ procedures while abroad<br>• Normally reside in a long-term care facility |
| **S** Specialty | Admission & consider ongoing screening based on risk assessment | Patients admitted to the following settings and/ or clinical specialties:<br>• High-risk settings – such as ICU, HDU, burns unit.<br>• High risk clinical specialties such as transplant, haematology/oncology or other services with immunosuppressed patients.<br>Multiple hospital treatments (for example haemodialysis). This includes people undergoing haemodialysis for the first time in a dialysis unit, periodically during dialysis treatment (preferably screening should be conducted every three months but not less than every six months) and on return from dialysis elsewhere<br>Ongoing access to healthcare for example Haematology/oncology patients |
| **K** Knowledge of local CPE transmission and risk factors | Admission & consider ongoing screening based on risk assessment | Patients who have:<br>• a known epidemiological link to a suspected CPE outbreak<br>• previously tested positive for CPE (screening may be as part of criteria for removal of CPE designation, or if have already been removed to ensure remains negative).<br>• had a prolonged hospital stay<br>Consider screening:<br>• when a high prevalence of CPE in a hospital in the same region (specifically with the same referral network of patient referrals)<br>• based on the epidemiology of the admission unit, such as known environmental risks, units with multi-occupancy rooms, units in previous outbreak status (where feasible to access this data) |

Table 1 has been adapted from Framework of actions to contain carbapenemase-producing Enterobacterales, UKHSA 2022.

* Repatriations from abroad: The receiving hospital should inform their IPC team at the time of the transfer request to enable an appropriate risk assessment to be undertaken, and relevant control measures implemented on arrival (including placement in a single room with dedicated toilet facilities and screening). MDRO screening should be conducted for this group of patients.

**Additional screening considerations:**

The vast majority of CPE detections have been from adult patients in acute hospitals, and infection in infants and children remains low. Potential risk factors for CPE infection in children are similar to those in adults, for example, intensive care admission, immunosuppression, contact with a healthcare service abroad, prematurity, presence of indwelling devices, history of surgery, prior antimicrobial use.

Factors to consider screening in this population should encompass risk factors as outlined in Table 1.

**Maternity settings**

The decision as to which screening process to choose - either universal or targeted - should be based on a risk assessment by local IPC teams in conjunction with AMS teams, and through local governance structures. See considerations for screening criteria as outlined in Table 1, which would also apply to this patient population. A risk based protocol, may be more appropriate for this setting, for example in special care baby units, where a documented local risk assessment by the IPC team indicates that the risk of CPE colonisation is very low and there is no evidence of CPE transmission in the hospital. Any such risk assessment should be reviewed at least annually.

**Specialist areas**

There are important areas of the healthcare setting where additional considerations regarding infection prevention and control, and management of CPE cases may be warranted. These include high-risk areas, palliative care settings, haemodialysis, paediatric settings hospital outpatient, operating theatres. There is now significant experience and understanding of the risks of CPE in such settings, and as such it is appropriate that this guidance recommends implementation of multi-layered interventions including standard and contact precautions, ensuring optimal hand hygiene compliance, ensuring adequately thorough and frequent cleaning and disinfection, and appropriate antimicrobial stewardship, which are all key to preventing transmission of CPE in all settings where care is provided. Hospital governance structures should ensure adherence to IPC/ AMS measures, identification of risk factors and local epidemiology for these settings and as

previously outlined in Table 1. Refer to local protocols, recognising local arrangements where applicable.

Decisions regarding which CPE screening approach (targeted or universal) to use in an acute setting on admission and in particular wards or patient cohorts, should be based on an individual hospital risk assessment. Such assessment should take into account  factors such as local epidemiology and regional prevalence of CPE, patient population, patient acuity, the level of care, interventions and carbapenem usage, local understanding of risk factors, resources and capabilities of different acute healthcare facilities, the risk of an outbreak; this variability means it is difficult to provide a definitive screening approach as there is no 'one size fits all' for CPE screening protocols. Each acute healthcare facility should conduct its own risk assessment on what their CPE screening strategy should be (including admission and ongoing screening) based on factors listed above and should have this agreed through local governance structures. There should be a process to continually evaluate local epidemiology, analysing data and undertaking prevalence studies at an appropriate frequency to understand risks and implement measures to prevent increasing prevalence, clusters or outbreaks as appropriate.

Repeated screening of individual patients may detect patients who were previously not recognised as carrying CPE in certain situations such as for long stay patients in intensive care units/ high risk units, or in areas with ongoing identification of transmission.

Culture based methods remain very useful as they allow for organism identification, antimicrobial susceptibility testing and referral of isolates to the National CPE reference laboratory. Culture may be used as a standalone method or to complement molecular testing methods. If CPE is initially detected on molecular testing, confirmation through culture is required in accordance with local protocols. Refer carbapenem resistant isolates or any rare carbapenemase to the National CPE reference laboratory service for further testing and analysis as appropriate, in line with the National CPE reference laboratory (NCPERLS) referral processes. Once an in-patient is found to be CPE positive on culture-based testing, no further screening of that person is necessary during their inpatient stay, as repeated screens

of the same patient usually remain positive for CPE over the course of a single hospitalisation.

For details on screening a person who is confirmed positive for CPE, please refer to the section on “Screening to determine clearance of CPE colonisation / infection”.

Active screening for CPE colonisation / infection is not usually required in outpatient departments, ambulatory care or non-acute care health settings unless there is evidence of transmission in these settings.

**CPE contact designation**

In the recent past, the approach taken in acute Irish healthcare settings was for an IPC team or public health doctor to identify a person or persons as having significant exposure to a person colonised or infected with CPE; this was done to indicate that this contact was therefore at higher risk of being colonised with CPE than others who had not had this exposure.

A person may be considered to be exposed to CPE if they have shared a multi-bed area or bay and/ or are known to have shared toilet facilities with a person identified as colonised or infected with CPE. An individual may be considered a CPE contact if this aforementioned exposure lasted 12 hours or longer. However, this recommendation is based on limited high-quality evidence and alternative strategies to CPE contact definition may also be reasonable as evidence evolves.

A comprehensive programme for CPE screening and testing of admitted patients across acute hospital settings has been in place in Ireland for several years. As such, the routine practice of identifying and designating people as CPE contacts and applying specific additional screening of these patients is not now generally recommended, although it may be required in specific situations based on risk assessment. An emphasis on managing the risk related to exposure to the healthcare environment is required instead.

It is generally not required to designate patients as CPE contacts if they have been discharged from hospital before the person they have shared space with is identified as CPE colonised or infected. It is therefore not required to record CPE contact designation in patient's records, if patients who were discharged home were subsequently identified as having shared this space. Historic CPE contact designations should be removed from a patient record, as admission screening processes should ensure patients are screened as appropriate.

CPE admission screening procedures should capture patients who subsequently re-present for admission to hospital and require screening.

It is important, however, that local IPC risk assessments are conducted in the context of newly identified CPE patients and ongoing CPE transmission identified through robust screening processes. Risk assessment may include performing a baseline

prevalence screen of patients in that ward to exclude the possibility of undetected transmission or an outbreak.

### Understanding the burden of CPE in a setting

Prevention-driven (i.e., not in response to a case) point prevalence surveys and admission screening are two strategies that can be used to detect colonised individuals. Periodic hospital population point prevalence studies (PPS), may be helpful to inform ongoing practice. Australian Guidance (2021) suggests the following approach, for example perform single or periodic (e.g. annual) point prevalence surveys of all patients and/ or high-risk areas to define the current epidemiology of CPE and detect changes in the burden of CPE in that setting. This may define the focus of future surveillance – for example whether to identify patients with CPE before or after admission. Approaches from the US CDC guidance suggest that prevention-driven, ad-hoc PPSs are performed once or intermittently to help define the regional epidemiology. These may identify facilities that have high CPE prevalence and/ or unidentified CPE transmission where additional IPC and/or screening efforts may be beneficial. Point prevalence surveys are also advocated in other guidance such as Smismans et al 2019 and Weinbren M., Inkster T. (2021).

## Screening to determine clearance of CPE colonisation or infection

Previous evidence suggested that once a patient has been designated as CPE colonised their designation is retained lifelong. It is recognised that this designation can have a substantial impact on patient's wellbeing, and as such it may be desirable to seek to delist or ‘clear’ the CPE status of an individual. Internationally, risk-based strategies have been adopted to identify patients who may be appropriate candidates for CPE clearance or delisting (e.g. Australian Commission on Safety and Quality in care 2021). It must be emphasised that this type of risk-based CPE clearance should only be led by IPC specialists.

Given that CPE colonisation may become temporarily undetectable but can re-emerge, particularly following antibiotic exposure, all patients who achieve CPE clearance or delisting status should be subject to ongoing risk assessment and screening upon each subsequent readmission (outlined in Table 1).

See Table 2 below for further detail.

# Table 2

**Screening and management of patients previously identified as CPE colonised.**

| Criteria | Screening | Management & Action |
|---|---|---|
| Less than 12 months since CPE positive screen | Screen on admission, however, manage as CPE positive | CPE designation remains<br><br>Manage with transmission- based precautions<br><br>A patient colonised with CPE cannot be considered cleared within 12 months of a positive result. |
| More than 12 months since CPE positive screen<br><br>**AND**<br>Patient had 3 negative screens one of those samples must be 12 months since CPE positive screen | Screen on admission (see Table 1) | Consider delisting, if appropriate.<br><br>If delisted, manage with standard precautions<br><br>**Note:** Consideration of the patient's current presentation and evolving risk factors need to be accounted for if this approach is appropriate in each individual case. |
| More than 12 months since CPE positive screen<br><br>**AND**<br>No repeat screening performed<br>**AND**<br>No identified risk factors* | Screen on admission (see Table 1); manage as CPE positive until all results available;<br><br>3 screens each taken at least 24hrs apart | Manage with transmission- based precautions<br><br>Could consider delisting, if appropriate, following 3 negative CPE screening samples, each taken at least 24hrs apart.<br><br>**Note:** Consideration of the patient's current presentation and evolving risk factors need to be accounted for if this approach is appropriate in each individual case. |

| | | |
|---|---|---|
| More than 12 months since CPE positive screen<br><br>**AND**<br>No repeat screening performed<br><br>**AND**<br>Identified Risk factors* as appropriate | Screen on admission (see Table 1); manage as CPE positive | CPE designation has not been removed.<br><br>Manage with transmission- based precautions during hospital stay, not appropriate to discontinue.<br><br>Clearance not appropriate at present as risk factors present |
| Patient with CPE designation removed | Screen on admission (see Table 1)<br><br>Day-only admissions do not require rescreening | Manage with standard precautions<br><br>**Note:** Consideration of the patient's current presentation and evolving risk factors need to be accounted for if this approach is appropriate in each individual case. |
| * Risk factors: see Table 1 for identified risk factors for consideration<br>Additional risk factor: patient is receiving antibiotics.<br><br>**NOTE**<br>Removal of CPE designation must only be made in consultation with the IPC team and reviewed on an ongoing basis. | | |

It is important to provide clear information to the person indicating that while the designation of CPE colonised is removed from their patient record it is not possible to give them an assurance that CPE has definitively cleared. There is reason to believe that in some people CPE may become undetectable for a period of time and yet re-emerge subsequently for example following exposure to antimicrobial agents. Therefore, all people formerly designated as positive for CPE but who have had that designation of CPE positive removed should be included in screening processes.

Based on principles on MDRO as outlined in the NCG IPC No 30, the following is recommended:

**Screening for CPE in the context of an outbreak/ cluster**

For advice on CPE Screening in the context of an outbreak/ cluster refer to the outbreak section.

**Screening for CPE outside of the acute hospital setting**

Routine screening for primary care settings or on admission to a care or residential home is not recommended.

Outside of the acute sector, screening strategies should be based on the local epidemiology, patient acuity and level of interventions. Local infection prevention and control/ Department of Public Health can assist with local risk assessments. A sample of how to conduct a risk assessment in non-acute settings is included in Appendix 4.

**Staff screening**

Staff screening is not recommended. There is no evidence of effectiveness, and it is not recommended in international guidelines or by experts.

**Patient accommodation**

**Acute Hospital setting**

**Known CPE colonisation/ infection**

It is recommended that patients with CPE in an acute hospital are accommodated in a single room with an en-suite toilet and bathing facilities. If this is not possible the patient should be accommodated in a single patient room with dedicated commode.

Where there are multiple patients with confirmed CPE, where feasible, they should be placed in single rooms in proximity to each other on one ward. This may minimise the risk of dissemination in the event of any lapse in infection control practice. It is accepted that there may be circumstances where this is not clinically appropriate or where it is not possible because of hospital infrastructure.

**Suspected CPE colonisation/ infection**

Where universal admission screening is in place – if it is not possible to pre-emptively isolate all patients while awaiting CPE screening results – isolate based on other indications for a single occupancy room and implement standard precautions.

Where risk-based admission screening – it may be possible to prioritise those at highest risk of having CPE detected for single occupancy room placement while awaiting results, but if not, await results and act on these, while implementing standard precautions.

Preliminary laboratory indications of possible CPE – these patients should be prioritised for single occupancy room if available while awaiting confirmation from laboratory.

Patients repatriated from healthcare overseas where MDRO, including CPE have significant prevalence, should be prioritised for single occupancy room while awaiting results and implement precautions.

**Cohorting in acute hospital settings**

Where placement in a single en-suite room is not possible, a patient with CPE may be placed in a designated multi-bed cohort area along with other patients with CPE of the same CPE mechanism (e.g. OXA-48 CPE cohorted together).

Note: Standard and contact precautions are required when moving between patients in a cohort area. If a patient in a cohort area develops other conditions that require single room placement, in their own right (for example new onset diarrhoea) they should be moved from the cohort area to a single room with dedicated toilet facilities as quickly as possible.

It is recommended that patients who do not have confirmed CPE colonisation should **NOT** be cohorted with patients with confirmed CPE colonisation or infection.

It is recommended that patients with CPE should NOT be cohorted with other patients with different CPE mechanisms.

Cohorted patients should have separate toilet and bathing facilities restricted for use by the patients in the cohort. One toilet per four cohorted patients is the minimum acceptable.

When a cohort of patients must share toilet facilities with each other, the toilets must be cleaned at least 4 times per day between 6 am and midnight and whenever they are noted to be visibly dirty. In addition, patients should have access to cleaning wipes, if available, so that they may wipe surfaces before use should they wish to do so; they should be advised to dispose of these safely, and so that they do not cause blockages to the system (in particular, not flushed in toilet facilities). Access to wipes is not a substitute for scheduled adequate cleaning but is intended as an additional measure to empower patients who wish have an assurance that the surfaces they have contact with are clean.

If a cohort area does not have access to a toilet dedicated for use by the cohort, options for managing this include:

a commode should be dedicated to each patient in the cohort area (as appropriate) and decontaminated after each patient use.

Where patients in a cohort area share toilet facilities, ensure that enhanced cleaning and monitoring schedule is in place.

Cohort areas should have adequate spacing between beds, (a minimum distance of 1m is required from edge of bed/ trolley to edge of bed/ trolley). When choosing a cohort area, the multi-bedded area chosen should ensure adequate space. An area with the minimum number of beds required to accommodate the cohort should be chosen to minimise the number of unused beds.

**The healthcare environment**

Environmental hygiene is a key factor in helping to reduce the spread of antibiotic-resistant bacteria, including CPE, in healthcare facilities. There is increasing emphasis on environmental reservoirs, for example hospital sinks, showers, and drains as ongoing risks for transmission of organisms to patients. In acute hospital settings, the environment surrounding patients known to be colonised with CPE has been found to be significantly contaminated. Experience in Ireland and internationally has resulted in increased focus on the hospital environment as a persistent reservoir for CPE and other multi-drug resistant Gram-negative bacteria (Enterobacterales and others), which is likely an important source of CPE acquisition for patients.

The healthcare environment is often contaminated with MDROs, such as CPE, many of which have the ability to survive in the environment for extended periods of time (Kramer et al., 2024).

Effective environmental cleaning and disinfection strategies can reduce the bioburden of MDROs such as CPE in the environment, which reduces the risk of infection transmission. Recontamination of the environment in the presence of a patient colonised or infected with CPE, can be rapid despite good standards of cleaning. As demonstrated in a study by Mitchell et al., 2023, patients admitted to a room where the previous occupant had a MDRO infection results in an increased risk of infection for the next room occupant. This highlights the role the healthcare environment plays in transmission of HCAIs. No cleaning schedule can be expected to eliminate CPE reliably while a colonised or infected patient is present in that space. Efforts should be focussed on containment and risk reduction: equipment should be dedicated to that specific patient. If this is not possible, meticulous cleaning and disinfection of any items before use with other patients is essential.

For specific guidance on environmental and equipment cleaning and disinfection is outlined in the NCG IPC No 30 at: http://health.gov.ie/national-patient-safety-office/ncec/

- Volume 1, section 3.1.3 Routine management of the physical environment
- Volume 1, pages 55-64
- Volume 2, Recommendations 5 – 6 Routine Management of physical environment, Volume 2, section 6.2.2

- Volume 2, section 7.1 Recommend routine cleaning frequencies
- Management and disposal of healthcare risk and non-risk waste in line with local management policy and linen and the NCG IPC No 30, Volume 1, section 3.1.8 Handling of linen.

**Sinks, clinical hand wash basins, showers and drains**

There is increasing emphasis on environmental micro-organism reservoirs, including of CPE, for example in hospital sinks, showers, and drains as cited in numerous research articles. Sinks can have complex associated pipework, difficult to eradicate biofilms and persistent contamination which can remain for prolonged periods acting as an environmental reservoir (Breathnach et al 2012, Weinbren 2020). A water-safe care approach has been adopted in several healthcare facilities internationally. Recommendations on elements of water safety pertaining to clinical hand wash basins, sinks, drains and biofilm are contained in the Infection Control Guiding Principles for Buildings Acute Hospital and Community. This guidance also recommends risk assessment regarding clinical hand wash basin and shower drain placement or removal from single patient rooms. This guidance is available on the following website www.hpsc.ie.

Evidence about infection risks from sinks and shower drains is an evolving area and advice should be sought from Capital and Estates and IPC colleagues about sink and shower drain placement to reduce risks and promote designs that support access for routine cleaning.

Strains of micro-organisms recovered from sinks have also been isolated from patients, but the route and/ or direction of transmission is difficult to determine and is often unclear.

There are several ways in which spread can occur:

- if the stream of water from the spout of a tap flows directly into the drain hole of the sink below, it could cause dispersal of drain water by splashing, and could contaminate surrounding surfaces and the person using that sink
- if drainage is partially blocked and water builds up in the sink bowl, there is likely to be a pooling of water and reflux from the drain – water flow from the tap will cause splashing and dispersal of contaminated water

- if showers do not drain efficiently, there can be reflux of water from the drain and contact between the shower user's feet and that contaminated water.

Water from tap spouts should not flow directly into the drain hole; this can still occur even if both conform to the guidance outlined in the Health Building Note (HBN 00-10 part C: Sanitary assemblies). Sink design and impaired drainage have been implicated in outbreaks of MDRO. Laboratory studies have confirmed that water flowing directly into a sink drain can disrupt established biofilm and or cause dispersal of contaminants present within the waste trap. Allowing back flow of water from the waste trap to accumulate within the basin has been shown to facilitate dispersal of contaminated droplets.

Poor penetration and/ or the inactivation of disinfectants within the biofilm means well established biofilms are highly resistant to disinfection. Whilst a variety of treatments have claimed to reduce biofilm in drainage systems, none have undergone extensive validation in more general use. Physical removal of biofilm from a sink or shower waste trap by cleaning is unlikely to be fully effective and any biofilm killed or removed will soon be replaced by biofilm recolonising from further down the drainage system. Attempts at cleaning waste traps are likely to disperse profuse contamination into the clinical area as well as contaminating the equipment used. Cleaning of waste traps should only be done whenever drainage is impaired or as planned preventative maintenance as part of a local schedule; surrounding surfaces and the equipment used should be thoroughly disinfected afterwards and precautions to contain contamination from this should be agreed with infection prevention and control teams.

Due to the nature of biofilms and their persistence in drains and associated pipework, it is important to focus on routine management of these items, ensure they are free draining and there is no splashing into the surrounding area and that items are not stored within 2m of the water source or drain. A risk-based approach to managing persistent contamination is recommended.

The importance of sink and shower design and their management such as engineering modifications, use of splash guards and reorganisation of storage adjacent to the surrounding space is addressed in the Infection Control Guiding Principles for Buildings Acute Hospital and Community available at www.hpsc.ie.

**Behaviours in the context of environmental contamination**

Many activities at clinical hand wash basin are not related to hand hygiene. Poor practices have been identified in several research studies including use of hand wash basins for disposal of fluid/ medication (including TPN, dialysis fluid, IV fluids, antimicrobials), waste disposal including urine, patients' wash fluids, drinks, coffee, juice etc. Nutrients such as food waste may both increase bacterial numbers in a bio-film and impede drainage and should not be disposed of via sinks. These factors provide an optimum nutrient rich environment and can therefore lead to proliferation of bacteria and MDROs, including CPE, in the sink (Shaw et al 2018, Weinbren et al (2021).

Hand wash basins should only be used for hand hygiene and not for:

•disposal of body fluids

•disposal of tea, coffee or other nutrient containing beverages

•disposal of IV fluids

•washing any patient equipment

•storage of used equipment awaiting decontamination

Due to points outlined above in this section the following recommendations apply in acute hospital settings:

1. Acute hospitals should have a complete and readily accessible inventory of drainage points and plumbing fixtures and fittings in clinical areas and food preparation areas. Any plumbing fixture and fittings that do not conform to current UK Health Building Note 001 Part C should be prioritised for replacement. Substandard fittings should be taken out of use, removed or replaced
2. Acute hospitals should have a process in place for periodic documented checking of all water drainage sites. This is to ensure that water drains freely and completely from all plumbing drainage points. This should occur as part of normal cleaning practices. An escalation process should be in place in clinical areas to ensure that any staff member or service user can report this to

the person in charge. A log of slow draining sites should be maintained to capture trends and possible linkages to cross transmission and outbreaks. It is recommended that drainage points with poor drainage or evidence of backflow should be taken out of use until repaired, where possible. A risk assessment including control measures to mitigate against the risk should be conducted and escalated through governance structures if this is not possible to achieve

3. Acute hospitals should have a system in place to alert patients and staff to the risks associated with poorly draining plumbing fixtures. Patients and staff should be encouraged to report evidence of drainage problems or backflow, and the relevant unit should be taken out of use until the problem has been resolved. (Taking a sink or shower out of use need not require restriction on admission to the associated bed spaces provided alternative arrangements to maintain hand hygiene, clinical services and patient's personal hygiene and bathing solutions are in place)
4. Where there are challenges to action the above recommendations due to competing factors, a risk assessment with associated control measures to mitigate against these risks and an escalation process should be in place through local governance structures
5. Acute hospitals should consider identifying if there is environmental contamination with CPE where there is evidence of sustained CPE acquisition in the hospital, suspected linkages between the environment and acquisition and outbreak activity. It may be appropriate on occasion, to conduct sampling based on a risk assessment such as to support an investigation of an outbreak or a variation in the local epidemiology of CPE detections, etc. It is important to recognise that environmental sampling, should not be conducted if there is no plan for interpreting and acting on the results obtained.
6. Evidence regarding environmental sampling in the context of CPE and persistent environmental reservoirs is an evolving area. Sampling should generally focus on sinks, shower trays and sluice/disposal areas. Guidance on collection and processing of samples, environmental testing for CPE is available on the following link: https://www.hse.ie/eng/about/who/healthwellbeing/our-priority-programmes/hcai/resources/cpe/environmental-testing-for-carbapenemase-producing-enterobacterales.pdf. Environmental screening in

non-outbreak situations is not recommended; it takes considerable resources and provides results that are not easily interpreted. available resources (for example, whether surveillance testing of a certain patient population or the hospital environment for the target MDRO is necessary and feasible) The decision to collect and process targeted environmental screening should be risk assessed and only considered as part of an outbreak investigation where specific environmental foci are suspected. This should be coordinated by the infection prevention and control team and be in accordance with local laboratory methods.

**Community and RCF settings**

Patients known to be infected or colonised with CPE may be encountered in non-acute healthcare settings including long term care facilities, such as nursing homes, residential homes and mental health services. This is a challenge as the facility also represents the individual's home. Also, patients known to be infected or colonised with CPE may be cared for in the home. Although the management of patients in these settings is different to the management of patients in the acute hospital setting, efforts, should still be made to prevent transmission of CPE in these settings.

There is a different emphasis in these settings as the risk is considerably less than in acute hospitals, emphasis in these settings should be towards horizontal approaches to IPC which includes hand hygiene, application of standard precautions, emphasis on environmental cleaning. Ideally, patients should be allocated a single room with dedicated toilet facilities (where available) and a risk assessment should be conducted to implement contact precautions, as appropriate, for example when a patient known to be colonised with CPE experiences diarrhoea.

Measures to manage the risk of CPE transmission, with measures such as ideally placing in a single room with dedicated toilet facilities and use of contact precautions, must be balanced with the obligation to provide and deliver appropriate care to patients in a timely manner. It is important to note that, as with all IPC practice, measures to manage the risk of transmission must be adapted to take account of the needs of individual patients, for example those with behaviours that challenge, dementia and in those approaching end of life. In addition, it is important to recognise the setting is both where the person receives care and is their home.

**Risk assessment**

Effective infection prevention & control is key to providing high quality healthcare for the people we care for, and those who access our services. It is also important to ensure a safe working environment for health and care workers. Infection prevention and control risk assessment is a continuum and should be incorporated into daily work practices. Community and RCF settings should continually monitor and review their IPC risks and ensure that controls are put in place to mitigate against these

risks. This action protects service users, staff, and visitors and ensure continuity of service delivery.

It is important to determine if additional measures beyond standard precautions are required for the people we care for where specific risk factors for transmission of microorganisms have been identified.

In RCF settings, screening for CPE is not routinely conducted or recommended. Where there is suspicion of CPE transmission in the RCF or in the event of an outbreak, limited screening may be justified where the IPC team/ Department of Public Health indicates that there is a requirement to conduct screening.

In community and RCF type settings, IPC risk assessment should take into account elements of a task or behaviour that may increase risk and therefore guide the decision to apply additional precautions (such as contact precautions) as appropriate. These precautions should consider overall care needs of the people we care for and should be made on a case-by case basis, such as when caring for those with a CPE or MDRO. Risk assessment should take into account the following in relation to managing CPE and other MDROs in community/ RCF settings: relatively healthy independent patient with uncontrolled secretions/ excretions.

The purpose of IPC risk management is to evaluate the risks posed for that individual in a particular area and determine what measures are required to mitigate against that risk. For the majority of times, most patients can be cared for using standard precautions. Patients with CPE do not need to be restricted to their rooms and can access group activities and make use of communal areas if they are independent, they are continent of faeces or their faeces can be contained, and they carry out supervised hand hygiene.

Any additional precautions implemented should have due regard to the overall care needs of the patient. A point of care risk assessment (PCRA) should inform the choice and selection of PPE, as appropriate for the application of contact precautions. Assessment of placement/ accommodation for the patient should take into account the following: requirement for a single room, cohorting with other patients with CPE or risk assessment of placement with patients assessed as low risk for acquisition, or those who have an anticipated short duration of stay.

Additional supervision and assistance may be required for a patient with cognitive impairment. Support with determining if someone is a high risk of infecting others is based on a risk assessment. Advice can be sought from public health/ local IPC teams/ Department of Public Health, as appropriate, see Appendix 4.

Refer to key principles of standard precautions, which should be applied as normal and as outlined in the earlier section. For further detailed advice, refer to the NCG IPC No 30 guidance, http://health.gov.ie/national-patient-safety-office/ncec/.

The NCG IPC No 30 provides case studies relevant to RCF and community settings and demonstrates the practical application of Risk Assessment Methodology in Practice. Tailored advice can be found in the latest version of the Community Infection Prevention and Control Manual: A practical guide to implementing Standard and Transmission-Based Precautions in Community Health and Social Care Settings, HSE Community Operations Infection Prevention & Control Nursing Teams.

**Communication**

The NCG IPC No 30 contains information on clinical communication in infection prevention and control, see Volume 1, good practice point No. 16, page 158.

**Communication with the patient**

Communication with the people we care for must be compassionate, truthful, timely, and clear. It is important to recognise that patients may find it difficult to understand and therefore it is recommended to communicate in plain English and refrain from using medical jargon and check the patient's understanding of the information given. Patients and/ or their support person may want to talk to you later about their diagnosis and treatment.

Provide the patient with the relevant AMRIC patient information leaflet, as appropriate. Supporting documents are available to assist with communication with patients with CPE such as "Healthcare associated infections (HCAI) and Antimicrobial Resistance (AMR); Information for healthcare workers". Relevant patient information leaflets can be ordered through www.healthpromotion.ie. Advice is available on: https://www2.hse.ie/conditions/cpe/

If things go wrong, the person must be told in a timely, open, compassionate, and honest manner. This applies to all patient safety incidents or adverse events. The HSE Open Disclosure policy provides guidance for all healthcare staff. Refer to this guidance on the following link: https://www.hse.ie/eng/about/who/nqpsd/qps-incident-management/open-disclosure/hse-open-disclosure-full-policy.pdf

**Communication and risk assessment**

Communication and consultation are key elements of clinical risk management. Refer to the NCG IPC No 30,Vol 1 page 24, for more information on communication and risk assessment, also refer to section 2.1.11 risk management basics advice at http://health.gov.ie/national-patient-safety-office/ncec/.

**Communication regarding transfer**

It is unethical to deny patients access to any healthcare facility or to make them accept unreasonable delays in access to a health care facility unless there is a compelling public health justification for doing so. Good communication will prevent unnecessary anxiety, misunderstanding or confusion for the family or healthcare facility receiving the patient.

Measures to manage the risk must be balanced with the imperative of delivering appropriate care to patients in a timely manner and in a location that takes reasonable account of their need to belong to a community and to have access to family and friends.

Any transfer of patients between inter hospital departments, such as radiology, theatre etc. or other facilities, for example, between acute hospitals, from acute hospital to primary care or from acute hospital to residential care should be preceded by advance and clear patient safety communication or alerts. Communication is critical when people move across services.

In addition to pre-transfer communication all relevant details should also be included in the written communication to other facilities from both medical and nursing teams that accompanies the patient. Communication should use appropriate channels that protect the patients' privacy. The communication should be initiated by the sending ward department/ facility and should include all relevant IPC information including any known colonisation/ infection with CPE or any other IPC alerts and any aspects of the patient's condition (physical or behavioural) that are likely to be relevant to

managing IPC related risks. Include CPE screening information as part of the discharge summary.

If the medical or nursing staff of the sending facility become aware of any new important information related to the IPC status of a patient after the patient has transferred the doctor or nurse receiving the information is responsible for ensuring that the information is communicated to the relevant medical or nursing staff in the receiving facility at latest on the next working day and immediately if the situation requires. The receiving service must take all practical measures to minimise the risk of transmission. Inter-facility transfers should not be delayed pending CPE screening or receipt of CPE screening results.

**Visitors in healthcare settings**

There should be no restrictions on visiting related to colonisation with CPE or other MDRO. Relatives and friends should not be required to wear personal protective equipment when visiting patients who are colonised with CPE. They should be encouraged to perform hand hygiene before and at the end of each visit.

If personal care is given by visitor/s, it may be appropriate for them to wear PPE. Staff can advise on selecting PPE, as required, and support care givers with how to put on and take off PPE and advise on performing hand hygiene following removal. Refer to local visiting arrangements for individual areas.

**Antimicrobial Stewardship**

This section is relevant to all healthcare settings in which antimicrobials are used. Antimicrobial use is the key driver of antimicrobial resistance. To limit, and ideally reverse, the increasing trends of antimicrobial resistance, judicious antimicrobial use is required. When an antimicrobial is required for a service user then the antimicrobial used, and its duration should be chosen wisely. This process of using antimicrobials wisely is referred to as antimicrobial stewardship (AMS). AMS promotes maximising the benefit of antimicrobials and causing the least harm for the individual service user. Harms caused by the antimicrobial for the service user can include adverse effects from the antimicrobial, development of antimicrobial resistance, and onset of *Clostridioides difficile* infection. AMS programmes are delivered by a multidisciplinary team using a suite of strategies and interventions and operate within the governance structure of a healthcare facility. All healthcare workers are antimicrobial stewards and successful implementation of AMS programmes requires collaboration between all members of the healthcare team, managers and service users. For more detail on the principles of AMS and the role each member of the healthcare team plays in AMS refer to the HSE antimicrobial stewardship (AMS) guidance for all healthcare settings (2022). This guidance is located on the AMS page on www.antibioticprescribing.ie. A comprehensive AMS programme addressing all antimicrobial use is important for the prevention and control of CPE in all healthcare settings.

For individual service users with suspected or confirmed CPE infection, consult a guide to treatment of CPE located on www.antibioticprescribing.ie

This specific guidance is a stand-alone guidance within the hospital related guidelines section.

All prescribers should be communicated with by the Lead Clinical Director on classes of antimicrobials that are reserved for use only on approval by Clinical Microbiologist or Infectious Diseases (ID) Physician. Refer to the latest version of the ‘HSE AMRIC Reserve Antimicrobials Policy’.

https://www.hse.ie/eng/services/list/2/gp/antibiotic-prescribing/hospital-related-guidelines/hse-amric-reserve-antimicrobial-policy-december-2024.pdf

## Outbreak

World Health Organisation (WHO) defines a disease outbreak as the occurrence of disease cases in excess of what is normally expected.

In relation to CPE, an outbreak can be declared if;

- There are two or more linked cases of CPE (colonisation or infection)
- There is an increase in the incidence of CPE above the background rate for that institution.

All providers must undertake a rapid risk and epidemiological assessment of the suspected outbreak to inform the necessary actions.

This definition should apply to potential CPE outbreaks where there have been until that point few or sporadic detections of CPE. CPE outbreaks can be prolonged especially where there has been an environmental reservoir. When all practical measures are in place and after a period of control measures of not less than 12 months and detection of new cases continues at a stable rate, it may be useful to consider that the pattern of detection has reached an endemic phase. Please refer to the previous section on Endemic CPE.

Acute care hospitals should have an understanding of which CPE types may be endemic in their settings. It is recommended that an outbreak be declared if there are two or more linked cases of a non-endemic CPE, for example a CPE type not typically seen in that setting, or two or more linked cases with of the endemic type of CPE occurring in a narrow time frame and with persuasive evidence of a link in space and time. Applying these definitions often requires clinical judgement which may be supported by liaison with the national CPE reference laboratory service regarding molecular characterisation of the patient isolates.

### CPE Screening in the context of an outbreak/ cluster

Patients may be assessed by the IPC team or public health doctors as having had a specific exposure or exposures that places them at higher risk of having CPE colonisation or infection. Whilst the previous process of designating a person as a CPE contact in non-outbreak settings has been discontinued, there are occasions for example, in the context of an outbreak or where judgement indicates that there is ongoing transmission in the acute hospital setting, a decision should be taken locally

by the IPC team to screen patients who are deemed to have had exposure, to detect the extent of the outbreak. The number of patients to be screened will be determined by the hospital IPC team on a case-by-case basis based on factors such as proximity to the index case, the nature and duration of exposure to patients and / or to an environmental reservoir. In high-risk units, consider screening all patients based on risk assessment by IPC team. These units might be considered at high risk because they include patients who are vulnerable, are immunocompromised or are heavily antibiotic exposed and patients who require devices. An enhanced period of screening is recommended during the outbreak or cluster period. As an example, the patients in the affected unit/ bay/ ward should be screened weekly; however, it may be appropriate to have a short period of screening of increased frequency if local laboratory and other resources can facilitate this. Once no new cases are detected the frequency of screening may be reduced and stopped at an appropriate point in time after no further cases have been detected. Experience with other resistant bacteria would suggest a pragmatic period of between 4 and 8 weeks.

If an outbreak is suspected or identified, refer to the NCG IPC No 30Volume 2: section 3.4 Management of multi drug resistant organisms (MDRO) and 3.4.2 outbreak investigation and management - this provides core strategies for infection prevention and control, and key principles and overall guidance for managing an outbreak. It is the responsibility however, of healthcare facilities to develop and adapt these principles to their setting and to develop local policies as required.

The NCG IPC No 30, recommends the provision of written and oral communication of findings as part of outbreak management. The HSE Open Disclosure Process is helpful to support the provision of clear information when informing patients of harm related to an outbreak and the importance of open, honest, timely and transparent communication. Refer to the following for further advice:
https://www.hse.ie/eng/about/who/nqpsd/qps-incident-management/open-disclosure/

**Risk identification for CPE screening of CPE contacts during outbreak investigation**

When cases during CPE outbreak activity are epidemiologically linked, for example in the same ward, the IPC team should conduct a risk assessment to determine risk factors which influence decisions on which additional inpatients to screen and at what interval.

Management includes decisions to cohort identified contacts, as appropriate until four negative screening results are achieved. Approaches and recommendations vary across international guidance. Recommendations in the Australian guidance 2021 include CPE contacts should be managed until three negative screening swabs taken at least 24 hours apart are received, or as otherwise advised by the infection prevention and control team. Guidance from UKHSA (2022) recommend an enhanced period of screening during the outbreak period as outlined above.

The NCG IPC No 30, Table 20 Outbreak investigation and management provides details on core elements required to manage an outbreak (steps 1-9) including advice on the formation of an outbreak control team (OCT) and suggested members.

**Outbreaks in RCF and community settings**

Where suspected transmission occurs in RCF and community settings, contact the local Department of Public Health/ local infection prevention and control team as appropriate for help with conducting a risk assessment. Appendix 4 contains advice on how to conduct a risk assessment in non-acute settings.

The principles for managing a CPE outbreak in a residential care facility in comparison to an acute hospital setting need modification for the setting. When there is a suspicion of cases of cross transmission of CPE, the IPC team aligned to that area and Department of Public Health should be informed so that they can perform a risk assessment to determine the scale of the risk and whether there is either possible or confirmed active transmission in the facility, and the appropriate components of response/ control measures.

## Accommodation

Although the principles of contact precautions are relevant in all healthcare settings it is not appropriate to apply those principles in the same way in a residential care facility as they are applied in an acute hospital setting. Specifically, single room with dedicated toilet facilities may be necessary in an acute hospital setting and may be acceptable for a relatively short period of time in that context, but it is rarely acceptable or necessary for people in residential care settings to be confined in a single room or denied social contact for extended periods. The practical application of contact precautions in a long-term care /residential facility will depend on each individual person. For many CPE colonised people, the risk of CPE spread to others associated

with spending time in common areas to participate in social activities is probably very low if people are continent, dressed and have been supported in performing hand hygiene properly before going to the shared area or joining the group.

Where a number of patients have tested positive for CPE, it may be appropriate to review their placement within the facility, however a local risk assessment should be undertaken to determine the most suitable approach to managing the persons individual needs.

Residential care facilities and other non-acute care facilities that have patients with CPE generally do not need to close to new admissions. Closing to new admissions may be appropriate in very exceptional circumstances for short periods, for example if advised by an outbreak control team.

Service user/ client movement to other areas and group activities should balance risk of transmission with the impact on the person's morale of limitation of movement within their home environment. The risk associated with mobile, people who are continent patients leaving their room to go to other areas including partaking in group activities, mealtimes and going for a walk outside is very low. They should be advised and educated on how and when to perform hand hygiene.

Ensure that patients who require support to perform hand hygiene (for example those who cannot independently access hand hygiene facilities) are appropriately supported and hand wipes are made available.

In all cases if further advice is required, contact the local IPC team / Consultant Microbiologist / Department of Public Health.

**Declaring that an outbreak is closed**

An outbreak may be declared closed by the OCT when a pre-defined period with no new cases has passed, appropriate outbreak control measures have been implemented and when the risk of ongoing transmission has been effectively mitigated. The OCT should develop local criteria based on risk factors specific to their patient population and setting on which to base the outbreak closure decision; for example if no new cases on that unit/ ward/ hospital have occurred through weekly screening for a period of weeks (as determined by the OCT) and any known cases have been discharged/ isolated in single occupancy ensuite rooms.

It may be practical to resume essentially normal service prior to formal declaration of the end of the outbreak subject to risk assessment and a judgment made at the OCT that there is no longer evidence of ongoing transmission.

In the context of a RCF setting, this facility should not have experienced any new cases of infection considered as likely to have been acquired in the RCF. An outbreak report should be completed to incorporate lessons learned and shared with local governance structures. See Appendix 5 for a sample outbreak template which can be adapted as required.

Refer to 7.7.10 Risk-management: Case study for management of confirmed case of

Carbapenemase Producing Enterobacterales (CPE) NCG IPC No 30 Volume 2 for further advice. The outbreak checklist is available in Appendix 6, this can be adapted as applicable to non-acute settings.

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## List of appendices

## Appendix 1

## Sample line listing headings

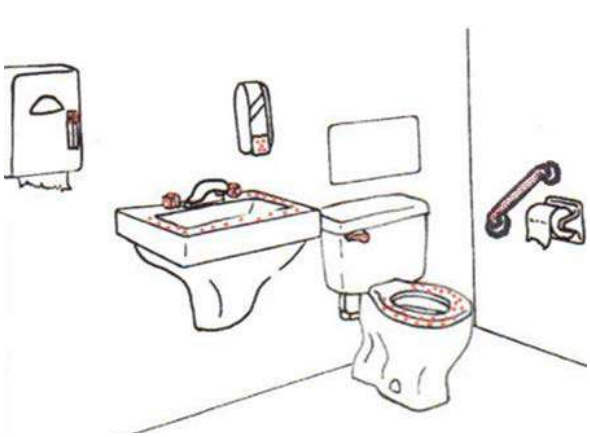
Note: Suggestion to create in Excel format with the following headings and filters in order to extract the data

1. Case number (no.1 is 1st case of the year etc.)
2. Specimen reported date
3. Ward/ clinical area & location in ward
4. Bed space (if available)
5. CPE enzyme
6. Hospital (as appropriate)
7. Directorate (as appropriate)
8. Patient MRN
9. Patient name
10. Linked cases (Y/N)
11. Linked wards (as appropriate)
12. Outbreak (Y/N)
13. Specimen No
14. Number of contacts identified (as appropriate)
15. Type of specimen, rectal swab/faeces, clinical (Filter)
16. Bacteraemia (Y/N)
17. Previous CPE contact (Y/N)
18. Screen type (admission screen, contact screen, weekly screen etc.)
19. Other relevant details
20. Records of case alerted to relevant clinician etc.

## Appendix 2

## Examples of high-touch items and surfaces in the healthcare environment

**Note:** Dots indicate areas of highest contamination and touch; useful to support cleaning practices



Patient bathroom

Hallway



Reference: PIDAC: Best Practices for Environmental Cleaning for Infection Prevention and Control | April 2018

# Appendix 3

## Risk assessment where access to single rooms with dedicated toilet facilities is limited

Example of risk assessment tool for placement of patients colonised with CPE: when to isolate in acute setting when single rooms with dedicated toilet facilities are limited.

This tool should be used in conjunction with HSE AMRIC Guide to prioritisation of patients for single room with dedicated toilet facilities when there are not sufficient single rooms for all patients that require contact precautions.

| **Criteria** | **Yes** | **No** |
|---|---|---|
| Does the patient have diarrhoea? (Type 6/ 7 on Bristol Stool Chart) | Manage in a single occupancy room on a general ward | see questions below |
| **Is the patient** | **Yes** | **No** |
| People who are continent of urine and faeces? | ✓ | |
| Alert and orientated? | ✓ | |
| Independently mobile? | ✓ | |
| **Consider caring for the patient in a bay on a general ward** | | |
| Is the patient | **Yes** | **No** |
| People who are continent of urine and faeces? | | X |
| Alert and orientated? | ✓ | |
| Independently mobile? | ✓ | |
| **Patient to be managed in a side room on general ward (refer to continence nurse for additional advice regarding the management of continence)** | | |
| Is the patient | **Yes** | **No** |
| People who are continent of urine and faeces? | ✓ | |
| Alert and orientated? | | X |
| Independently mobile? | ✓ | |
| **Take into account clinical environment and risk; consider moving patient to an alternative area if disoriented and unable to comply with placement in a side room** | | |
| Is the patient | **Yes** | **No** |
| People who are continent of urine and faeces? | ✓ | |
| Alert and orientated? | ✓ | |
| Independently mobile? | | X |
| **Patient can be nursed in a bay on a general ward with a dedicated commode** | | |

Reference: Framework of actions to contain carbapenemase-producing Enterobacterales, HSA UK 2022.

Use in conjunction with HSE AMRIC Guideline: Guide to prioritisation of patients for single room isolation when there are not sufficient single rooms for all patients that require Isolation, available at: https://bit.ly/4mEGNT0 and Guidance on Balancing Competing Demands in Relation to Restrictions on Bed Use Related to Infection Prevention and Control in Acute Hospital settings available at https://bit.ly/4kvQ9PF

## Appendix 4

## How to conduct a risk CPE assessment in non-acute settings

At all risk levels ensure:

- standard infection control precautions are maintained at all times
- effective environmental hygiene and cleaning – prevention of faecal and environmental contamination is crucial; remain alert to episodes that risk direct transmission to others and or environmental contamination; ensure timely and thorough cleaning.
- cleaning and disinfection of contaminated surfaces / equipment as required.
- hygiene advice to individual and family and exposed individuals (as appropriate) it is important to inform individuals and those around them to ensure they take appropriate personal hygiene measures to prevent the spread of infection, especially when using the toilet. Provide relevant information leaflet.

Risk assessments must include consideration of the care environment, for example access to single, en-suite rooms, access to high quality, trained cleaners, access to hand hygiene facilities, and the nature of the setting; examples may include residential care/ older persons residential care setting, specialist or general-rehabilitation, dementia care unit, community hospital or hospice, mental health setting , residential care, domiciliary care, and where is provided etc.
If the individual is colonised (the presence of bacteria on a body surface, such as skin or gut, without causing disease in the person): single room with en-suite and bathing facilities including toilet or designated commode, bathing/ showering facilities is recommended. Where a single room is not available, it is recommended that a designated toilet or commode is made available. No curtailment/ restrictions of communal activities/ group therapy or attending shared areas is required if the risk of transmission to others is identified as lower, for example where the resident is fully clothed, people who are continent/ contained incontinence, no behaviours that challenge and engaged in hand hygiene prior to attending.

Conduct a risk assessment with your IPC Team, refer to Department of Public Health / Consultant in Public Health as relevant to discuss CPE status and consider the mental and physical health and wellbeing of the individual when deciding to isolate.

Always communicate IPC information on an individual when transferring the individual between care settings. Communication should be discrete and on a need-to-know basis to protect the patient's privacy and dignity. Detailed guidance related to communication regarding AMR organisms (AMRO) is available in the document "Discussing HCAI and AMRO with patients" available at www.hse.ie/hcai

| Care needs | Guidance for risk assessment |
|---|---|
| **High risk**<br>For example, the individual has:<br>• diarrhoea, faecal incontinence, etc.<br>• discharging wound<br>• long term ventilation support | Identify if there is an immediate risk of transmission to others and the shared environment.<br>Discuss management with GP or clinician in charge, IPC team / Department of Public Health / Consultant in Public Health |

<table>
<tr><td>

- confusion and dementia
- device(s) in situ medical devices, e.g. urinary catheter / I.V. line
- undergoing invasive procedures

</td><td>Consider the psychosocial impact of contact precautions on the service user and the level of supervision required.</td></tr>
<tr><td>Medium risk<br>For example, the individual requires assistance with hygiene, mobility or physical rehabilitation.</td><td rowspan="2">No immediate risk of infecting others identified:<br>• standard infection control precautions are maintained<br>• hygiene advice is provided to individual and family and exposed individuals (as appropriate)<br>• maintain effective environmental hygiene<br><br>Further advice can be obtained from your local Department of Public Health / Community IPC Nursing team</td></tr>
<tr><td>Low risk<br>For example, the individual is independent and self-caring.</td></tr>
</table>

Reference: Framework of actions to contain carbapenemase-producing Enterobacterales, UKHSA 2022.

For further information contact your local Infection prevention and control team or refer to the latest version of the Community Infection Prevention and Control Manual.

## Appendix 5

## Sample outbreak report template (adapt as required)

| | | |
|---|---|---|
| **Healthcare facility:**<br>**Ward/ Unit:**<br><br>**Outbreak type:** | | |
| **Date outbreak opened:** | **Date outbreak closed:** | |
| **Outbreak details:** | | |
| **1.** | Date of detection of first case: | |
| **2.** | Name of wards affected & location in ward: | |
| **3.** | Date outbreak declared: | |
| **4.** | Number of positive HCAI cases from this outbreak: | |
| **5.** | Number of ward contact patients identified: | |
| **6.** | Dates for outbreak control team meetings: | |
| **Control measures** | | |
| **7** | Closure of ward if necessary: | |
| **8** | Contact patients identified, as appropriate: | |
| **9** | Managing visiting | |
| **10** | Alert notices in place | |
| **11** | Increased cleaning frequency | |
| **12** | Personal protective equipment available | |
| **13** | Alcohol based hand rub available | |
| **14** | Patient contact tracing implemented, as per IPC assessment | |
| **15** | Communication in place regarding transfers of affected patients to unaffected areas or to other inpatient areas or to residential care settings | |
| **16** | Patient records/ ICT record flagged as indicated | |

## Appendix 6

## Checklist for CPE outbreak/ endemic CPE management and control

**Note**: this checklist is included in this document for illustration purposes.

The checklist can be used in situations where CPE is endemic to ensure that control measures are monitored and actioned as appropriate. This checklist can be downloaded as a modifiable word document from the CPE guidance section of the HPSC website.

| Number | Checklist point (brief) | Check/ Note |
|---|---|---|
| **Section A. Informing key stakeholders and notification** | | |
| A1 | Relevant internal communication | |
| A2 | Notification to the Dept of Public Health | |
| A3 | Inform HPSC | |
| A4 | Inform HSE-AMRIC | |
| A5 | If HSE-AMRIC support required request same | |
| **Section B. Surveillance** | | |
| B1 | Convene OCT | |
| B2 | Are OCT meeting sufficiently frequent with attendance by key stakeholders? | |
| B3 | Are surveillance and microbiology updates available? | |
| B4 | Does OCT agenda cover key points? | |
| B5 | Do ward staff have updates on status? | |
| B6 | On site lab confirmation of CPE organism and type | |
| B7 | Consider need for epidemiological evaluation | |
| **Section C. Screening and patient placement** | | |
| C1 | Is ward closure necessary? If so, what are re-opening criteria, and plans for communication of this to patients and visitors | |
| C2 | Are patients appropriately accommodated? | |
| C3 | Are individual patient needs considered? | |
| C4 | Dedicated equipment for patients with CPE | |
| C5 | Check CPE screening practice | |
| C6 | Contacts identified and screened (as appropriate) | |

| | | |
|---|---|---|
| C7 | CPE contacts delisted after 4 negative screening results, as advised by the infection prevention and control team | |
| C8 | Microbiology laboratory has resources | |
| C9 | Laboratory capacity adequate for weekends | |
| **Section D.<br>Patient movement** | | |
| D1 | Limit patient movements as appropriate | |
| D2 | Limit patient transfers as appropriate | |
| D3 | Transfers between departments are planned | |
| D4 | Transfers to other facilities planned and communicated Check communication/ documentation | |
| D5 | No undue delays in transfers | |
| **Section E.<br>Staff education** | | |
| E1 | Training records checked and refresher training provided where necessary | |
| E2 | Additional IPC audits including hand hygiene, environment etc. | |
| E3 | Real time feedback on performance | |
| E4 | Adequate PPE stocks | |
| E5 | IPC nursing resources to support education, outbreak support and management | |
| E6 | Check hand hygiene facilities and availability and access to hand gel; wastewater drainage, clinical area free from clutter | |
| E7 | Check toilet facilities (refer to infection control guidance principles for buildings, acute hospitals and community settings) | |
| E8 | Check dirty utilities, bed pan washers (temperature controls, service records, test soils etc.), bed pans and commodes | |
| **Section F.<br>Communication with staff** | | |
| F1 | Staff members notified of outbreak | |
| F2 | Support for ownership / leadership of outbreak response | |
| F3 | Designated shared folder considered | |
| F4 | Occupational health resourced to support as required | |
| F5 | Appropriate on-ward signage | |

| | | |
|---|---|---|
| F6 | Appropriate signage at ward entry | |
| **Section G.**<br>**Communication with patients, visitors and public** | | |
| G1 | Patients are informed promptly; check of documentation to confirm this has taken place | |
| G2 | Use an electronic IPC software alert flag on ICT systems if available | |
| G3 | Consider pro forma to support documentation | |
| G4 | Patient information on being infection aware and outbreak communication as required | |
| G5 | Visitor information on hand hygiene | |
| G6 | Short written message for patients | |
| G7 | Hospital communications department proactive | |
| **Section H.**<br>**Communication between healthcare facilities** | | |
| H1 | Communication is “need to know” | |
| H2 | Formal record alert for all patients and audit this is in place | |
| H3 | Check to ensure function of formal alert process are in place | |
| H4 | Retrospective placement of alerts if required | |
| H5 | Check discharge letters to GP, as appropriate | |
| H6 | Preformat communication for lead Consultant and GP | |
| H7 | Consider local secure CPE database/ line listing/ process to capture data, as appropriate | |
| H8 | Inform other healthcare facilities of CPE apparently acquired there | |
| **Section I.**<br>**Environmental hygiene** | | |
| I1 | Hygiene services on OCT | |
| I2 | Check adequate cleaning and disinfection of environment and equipment | |
| I3 | Check cleaning technique | |
| I4 | Microbiological sampling of the environment (as appropriate) | |
| I5 | Consider tools to assess cleaning | |

| | | |
|---|---|---|
| I6 | Consider use of a tool to assess equipment cleaning | |
| I7 | Consider novel decontamination systems | |
| I8 | Multidisciplinary hygiene audit teams | |
| I9 | Check integrity of surfaces & fittings | |
| I10 | Check integrity of chair and furniture coverings | |
| I11 | Check integrity of mattresses & pillows | |
| I12 | Check toilets – ease of cleaning | |
| I13 | Check plumbing conforms to health building note & free draining | |
| I14 | Audit of dirty utility, bed pan washers etc. | |
| I15 | Ensure all ventilation service records and monitoring records within affected areas are up-to- date and signed-off by technical services department staff | |
| **Section J.<br>Minimise clutter** | | |
| J1 | PPE is easy to access and properly stored | |
| J2 | Unnecessary equipment removed | |
| J3 | Equipment for decontamination appropriately stored | |
| J4 | Old equipment disposed of | |
| J5 | Adequate chairs | |
| J6 | Single room doors closed | |
| **Section K.<br>Minimise traffic; consider, as appropriate** | | |
| K1 | Consider additional controls on visiting | |
| K2 | Consider cease non-essential services | |
| K3 | Review pastoral care services | |
| K4 | Consider volunteer services | |
| K5 | Limit volunteer visits to one person | |
| K6 | Consider restricting student activity | |
| K7 | End ward rounds on affected ward | |
| **Section L.<br>Antimicrobial stewardship** | | |
| L1 | Review antimicrobial consumption data in critical groups | |
| L2 | Ensure communication regarding reserved antimicrobials | |

| | | |
|---|---|---|
| L3 | Consider removal of certain antibiotics from ward stock | |
| L4 | Report from pharmacist to OCT | |
| L5 | Consider AMS resource allocation | |
| L6 | Assess for reduction in use of reserve agents | |
| L7 | Consult infection specialist/s on treatment of infection | |
| L8 | Capture date on outcome of CPE infection | |
| L9 | Provide antimicrobial data for inclusion in outbreak report | |
| L10 | OCT agenda to include patients commenced on treatment for CPE | |
| L11 | Review all antimicrobial use and related practices to reduce unnecessary antimicrobial use | |
| **Section M. Resources** | | |
| M1 | Confirm adequacy of ward resources (human and other) | |
| **Section N. Outbreak closure** | | |
| N1 | Refer to guidance to guide on assessing end of transmission | |
| N2 | Inform public health | |
| N3 | Send outbreak report to the Dept of Public Health | |
| N4 | Send outbreak report to healthcare facility governance structure | |