Toolkit for the early detection, management and control of carbapenemase-producing Enterobacteriaceae in Scottish acute settings

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List of abbreviations

ABHR	Alcohol-Based Hand Rub
AMT	Antimicrobial Management Team
CPE	Carbapenemase-producing Enterobacteriaceae
CRA	Clinical risk assessment
HAI-ORT	Healthcare Associated Infection Incident and Outbreak Reporting Template
HIIAT	Healthcare Infection Incident Assessment Tool
HPT	Health Protection Team
ICM	Infection Control Manager
ICD	Infection Control Doctor
IMT	Incident Management Team
IPCT	Infection Prevention and Control Team
NIPCM	National Infection Prevention and Control Manual
PHE	Public Health England
PPE	Personal Protective Equipment
SAPG	Scottish Antimicrobial Prescribing Group
SICPs	Standard Infection Control Precautions
SMVN	Scottish Microbiology & Virology Network
TBPs	Transmission Based Precautions

Table of Contents

1 Aims and scope

This document provides practical advice aimed at Infection Prevention and Control Teams (IPCTs), clinicians and frontline staff on the early detection, management and control of carbapenemase-producing Enterobacteriaceae (CPE) in acute healthcare settings (including independent healthcare settings).

This toolkit has been adapted from Public Health England's (PHE) "Acute trust toolkit for the early detection, management and control of carbapenemase-producing Enterobacteriaceae"[1], for use in Scottish acute settings, and supersedes the Scottish Interim Guidance, "Non-prescribing control measures to prevent cross-transmission of carbapenemase-producing Enterobacteriaceae"[2], published in June 2013. In addition, extensive consultation was undertaken with an expert CPE Screening Short Life Working Group who informed the adaptations to ensure the toolkit was fit for purpose in Scotland.

Whilst this toolkit focuses on CPE, consideration for other carbapenemase-producing organisms with demonstrable carbapenemase activity is essential. These organisms include some strains of *Pseudomonas* sp. and *Acinetobacter* sp. The Healthcare Infection Society guidelines "Prevention and control of multi-drug-resistant Gram-negative bacteria: recommendations from a Joint Working Party" found that that there was insufficient evidence to mandate routine admission screening of all patients for these and other multi-drug resistant Gram negative organisms, however, recommends screening for these organisms during the management of outbreaks.[3] The infection prevention and control (IPC) advice in this document will assist in the management of patients infected or colonised with other multi-drug resistant Gram negative organisms, although each species merits individual consideration.

This toolkit does not include prescribing advice for the treatment of CPE infections, but refers to guidance produced by the Scottish Antimicrobial Prescribing Group (SAPG).

The guidelines set out in this toolkit are the <u>minimum standards</u> recommended for the early detection, management and control of CPE. Local IPCTs may choose to extend the scope of their own local policy based on local risk assessment.

2. Introduction

2.1 What are CPE?

Enterobacteriaceae are a family of Gram-negative bacteria which are part of the normal range of bacteria found in the gut of all humans and animals. However, these organisms are also some of the most common causes of opportunistic urinary tract infections, intra-abdominal infections and bloodstream infections. They include species such as *E. coli*, *Klebsiella* sp., *Proteus* sp. and *Enterobacter* sp..

Carbapenems are a valuable family of very broad-spectrum antibiotics which are normally reserved for serious infections caused by drug-resistant Gram-negative bacteria (including Enterobacteriaceae). They include meropenem, ertapenem, imipenem and doripenem.

Carbapenemase-producing Enterobacteriaceae (CPE) are a type of Enterobacteriaceae that are resistant to carbapenem antibiotics. These bacteria carry a gene for a carbapenemase enzyme that breaks down carbapenem antibiotics. There are different types of carbapenemases, of which KPC, OXA-48, NDM and VIM enzymes are currently the most common.

Infections caused by CPE are associated with high rates of morbidity and mortality and can have severe clinical consequences.[4] Treatment of these infections is increasingly difficult as these organisms are often resistant to many and sometimes all available antibiotics. [5]

2.2 Why provide this toolkit?

Over the last decade CPE have spread throughout the world and are now endemic in healthcare facilities in many countries.[6] In the UK, over the last five years, there has been a rapid increase in the incidence of infection and colonisation by multi-drug resistant carbapenemase-producing organisms.[7;8] Until recently, most cases in the UK were imported cases in people who had been in hospital abroad. However, there are already selected

hospitals within regions such as Manchester where CPE can be considered endemic. Therefore, there is a real risk that CPE could become endemic across Scottish healthcare.

A number of clusters and outbreaks have been reported in England, some of which have been contained. This provides evidence that when appropriate control measures are implemented, these clusters and outbreaks can be managed effectively.

2.3 Why does carbapenem resistance matter?

Carbapenem antibiotics are a powerful group of β-lactam (penicillin-like) antibiotics used in hospitals. Until now they have been the antibiotics that doctors could rely upon to treat infections caused by Gram-negative bacteria when other antibiotics failed. Due to the lack of new antibiotics under development, carbapenems may be regarded as drugs that should only be used as a last resort, and a critically important group of agents whose effectiveness must be preserved. Unless action is taken now, the rapid spread of carbapenem-resistant bacteria has great potential to pose an increasing threat to public health and modern medicine as we know it.

2.4 How can CPE be detected early and spread prevented?

Advice is provided in the following chapters to assist in the early detection, prevention and control of CPE, particularly for organisations that have had little or no experience of these organisms. For organisations that already have established or recurrent problems with the spread of these organisms, there are additional actions that are required in order prevent and minimise the spread (see checklists in Sections 8.2 and 8.3). The approach recommended in this toolkit includes additional IPC measures for acute settings where the risk of spread, and its consequences, is greater than in non-acute settings. A toolkit is also provided for non-acute care settings[9] where it is acknowledged that care cannot, nor needs to be, subjected to the same additional IPC measures.

Part A – intended for use by frontline staff in acute healthcare settings

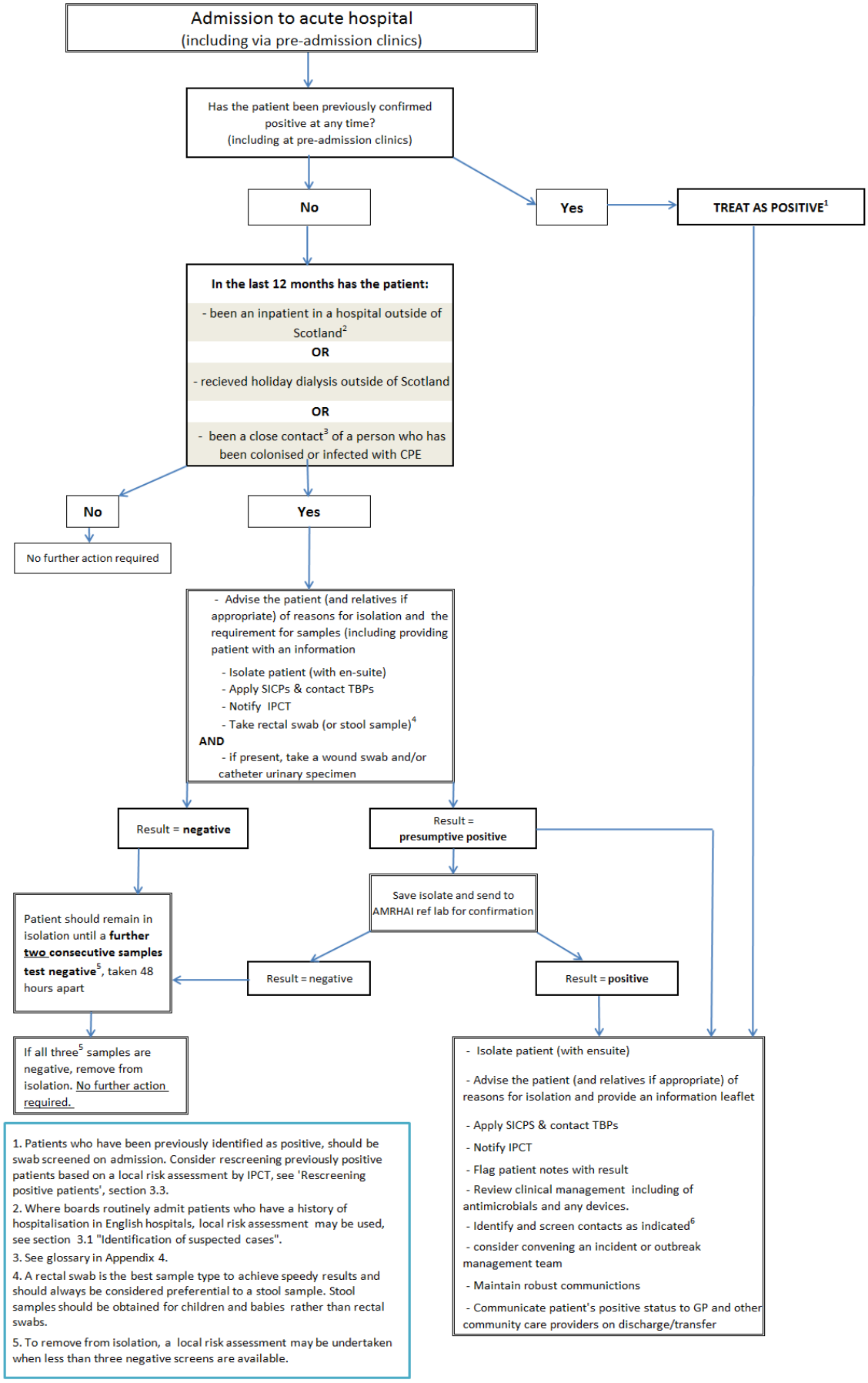
3. Identification and management of suspected and confirmed cases, and contacts.

This section of the toolkit provides guidance in the following:

- identification of suspected cases of CPE using a clinical risk assessment (CRA) (Section 3.1)
- management of suspected cases identified by the CRA (Section 3.2)
- management of confirmed cases (Section 3.3)
- management of contacts of cases (section 3.4)

The steps to identify and manage suspected and confirmed cases of CPE are described in Flowchart 3.1. The flowchart should be applied to all inpatients admitted to acute hospitals including paediatric patients.

Figure 3.1 Patient admission flowchart: identification and management of suspected and confirmed cases of CPE



3.1 Identification of suspected cases on admission to hospital: Clinical risk assessment (CRA)

KEY MESSAGE: Include this risk assessment as part of the routine admission procedure to identify suspected cases of CPE

Clinical risk assessment (CRA) allows for the early identification of patients who are colonised or are at high risk of being colonised with CPE. The risk assessment criteria set out below, and in the flowchart (Figure 3.1) should be included as part of routine procedures for every admission to identify suspected cases of colonisation (or infection) with CPE. Each patient should be assessed on admission, readmission or transfer from another healthcare facility.

CRA-based screening may also be undertaken a pre-admission clinics to increase early detection of CPE positive patients prior to admission. Patients who are admitted via pre-admission clinics who are not identified as CPE positive from testing during this process should follow the normal admission screening process, including application of the CRA, at time of admission to the hospital.

*Note: if the patient has ever been previously positive for CPE, the admission CRA should be bypassed and the patient immediately managed as a **confirmed case** of CPE (refer to Section 3.3 Management of Confirmed Cases).*

Clinical risk assessment

The CRA defines a suspected case based on the identification of at least one the following risk factors within the 12 month period preceding admission:

1. Been an inpatient in a hospital outside of Scotland[a]
2. Received holiday dialysis outside of Scotland[a]
3. Been a close contact[b] of a person who has been colonised or infected with CPE

Any patient with a positive response to any of the CRA questions should be managed as a **suspected case** (Refer to section 3.2 Management of Suspected Cases).

[a] Where boards routinely admit patients who have a history of hospitalisation in English hospitals, local risk assessment based on intelligence from cross-border facilities may be used to determine need for screening. In addition, boards may wish to screen transfers from within Scotland based on their own local risk assessment.

[b] A close contact is defined as a person living in the same house; sharing the same sleeping space (room or hospital bay); or a sexual partner

IPCTs should ensure that risk assessment takes place and it is effective by:

- ensuring the CRA is included in routine admission and transfer documentation
- providing training for all relevant staff in:
    - taking an effective admission history
    - recognising patients who meet the criteria for a suspected or laboratory confirmed case
    - the content of the local CPE Management Plan (see Section 8.1, CPE management plan)
- acting promptly if a suspected or laboratory-confirmed case presents on admission to hospital.

3.2 Management of suspected cases

KEY MESSAGE: If you have a suspected case of CPE this step is required to prevent spread within the hospital.

If one or more of the criteria in the CRA are met the patient should be considered a suspected case of colonisation or infection.

Note: If **the patient has ever been previously positive for CPE**, the patient should immediately be managed as a **confirmed case of CPE** (refer to Section 3.3 Management of Confirmed Cases).

Management of a suspected case

- Patient should be immediately isolated[a] in a single room with en-suite facilities (or designated commode if en-suite is unavailable)
- SICPs and contact TBPs should be applied as per the National Infection Prevention and Control Manual (NIPCM) [10]
- Screening samples(s) should be taken and sent for testing
- Ensure that the laboratory, IPCT and relevant clinicians have been informed
- Advise the patient (and relatives if appropriate) of reasons for isolation and the requirement for samples (including providing patient with an information leaflet[11])[b]
- Advise the patient (and relatives if appropriate) about the importance of hand hygiene and personal hygiene in preventing transmission.

[a] consider cohorting patients with dedicated nursing team if insufficient rooms available for isolation. A local risk assessment should be undertaken before deciding to cohort patients.

[b] healthcare worker information leaflets are also available[11]

Obtaining a sample for testing

If a screening sample is required the following samples are required as a minimum:

- A rectal swab, making sure faecal material is visible on the swab[a]

OR

- A stool sample (if a rectal swab is not feasible/acceptable)[b]

AND

- A wound swab and/or urine sample if the patient is catheterised

[a] A rectal swab is the best sample type to achieve speedy results and should always be considered preferential to a stool sample (with the exception of children-see below). A rectal swab is 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 to enable organism detection in the laboratory. A rectal swab should not be mistaken for a perineal swab.

[b] Stool samples should be obtained for children and babies rather than rectal swabs.

Other sample types (over and above those required as a minimum) may be sent for testing. The decision to send additional samples should be based on local risk assessment.

All samples should be sent to the laboratory as soon as possible, ensuring the sample request form is **clearly marked as a CPE screening sample.**

Acting on positive results

Should any of the screening samples test **POSITIVE** for CPE, the patient should be managed as a **confirmed** case (refer to Section 3.3 Management of Confirmed Cases).

Acting on negative results

If the screening sample result is **NEGATIVE**, the patient should remain in isolation until a further two consecutive samples test negative and a risk assessment has been undertaken. These samples should be taken 48 hours apart, i.e. take a sample on day 0 (the initial sample), day 2 and day 4.

Note: In the event of an initial negative screening test, local risk assessment may be

undertaken by the IPCT to determine the need for subsequent testing of patients. This risk assessment may consider the sensitivity and specificity of the tests undertaken by the local laboratory. For example, boards using molecular diagnostics may decide, following careful and individual risk assessment, that one negative sample is sufficient to remove a patient from isolation. Consideration should be given to the effectiveness of the swabbing technique and this should also be included within the local risk assessment.

Once three consecutive negative results (or local risk assessment following one negative result) are achieved, and following discussion with the IPCT, the patient can be removed from isolation with no further samples required. Should any subsequent samples test positive, the patient should be managed as a confirmed case (refer to Section 3.3 Management of Confirmed Cases).

3.3 Management of confirmed cases

KEY MESSAGE: If you have a confirmed case of CPE this step is required to prevent spread within the hospital.

If a patient has ever tested positive for CPE (either from a screening sample OR from a routine clinical sample during this or previous admission episodes) the patient is considered a **confirmed** case of CPE.

Management of a confirmed case

The following steps should be taken on identification of a confirmed case of CPE:

- the patient should be immediately isolated and remain in isolation for the duration of their hospital stay.
- samples should be obtained using the same protocol as described in Section 3.2- Obtaining a Sample for Testing
- SICPs and contact TBPs should be applied as per the NIPCM[10].
- where there are other cases of multi-drug resistant Gram-negative organisms, a CPE case should be considered as highest priority for use of a single room facility.[3] Local risk assessment to determine priorities should be undertaken by the IPCT.
- if the patient has an infection, they should be assessed for appropriate treatment (see Section 6).
- the patient, and family (as appropriate), should be informed of a positive result and the information leaflet provided.[11]
- the patient should be advised (and relatives if appropriate) about the importance of hand hygiene (especially after using the toilet) and personal hygiene in preventing transmission of infection to others.
- the patient's notes should be updated to include details of flagged with the positive CPE result.
- information about the positive result should be included on all transfer/admission documents if the patient is moved to another healthcare setting or referred for community care (see Appendix 1).
- all relevant staff should be made aware when a suspected or recent laboratory

confirmed case of CPE colonisation or infection has been identified.

- an immediate initial assessment should be undertaken to investigate the likely source or sources.
- rapid promotion of adherence to the local CPE Management Plan (Section 8.1) should take place, including the need for compliance with its recommendations.

Rescreening positive patients

An apparently cleared carbapenemase-producer can regrow to a detectable level in the gut flora of patients. A previously positive individual with subsequent negative screening results can revert to a positive state.[3]

Rescreening positive patients

- Screening of previously positive patients **should be** undertaken on admission.[3]
- Weekly screening of confirmed cases **may be** considered to maintain an understanding of the patient's current status whilst in hospital. The decision to weekly screen a previously positive patient should be based on local risk assessment by the IPCT.
- Patients who have previously been positive should always be treated as positive and managed as a confirmed case. However, in extenuating circumstances, if the patient has had 3 negative screens taken a minimum of 48 hours apart, a local risk assessment may be undertaken by the IPCT to determine whether the patient can be removed from isolation. Consideration should be given to the effectiveness of the swabbing technique and this should also be included within the local risk assessment. Extenuating circumstances may include the patient's wellbeing particularly in patients being cared for long term in acute care e.g. neuro-rehabilitation patients.
- A patient with CPE infection should not be removed from isolation.

Consistent application of SICPs is essential when managing the following:

- intravenous / peripheral line
- central venous catheter line
- urinary catheter
- ventilators
- wound and drains

- renal dialysis equipment
- enteral feeding equipment
- colostomy or ileostomy
- loose stools/diarrhoea
- any re-usable diagnostic equipment

Note: Loose stools or diarrhoea (for any reason) increases the risk of spread of bacteria from the gut.

Should a patient who is colonised or has a CPE infection require a non-emergency diagnostic test or procedure which cannot be undertaken in the patient's room, the procedure should be planned, wherever possible, at the end of the day's list and the room cleaned in accordance with the NIPCM.[10]

Outpatients and renal dialysis patients: Similarly, known positive outpatients who require renal dialysis, or a diagnostic test or procedure, should be planned, wherever possible, at the end of the day's list and equipment cleaned as per the NIPCM. Known positive renal dialysis patients should be isolated, wherever possible.

Holiday dialysis patients: It is good practice to request the CPE status of patients from outside Scotland who attend Scottish units for holiday dialysis. Local risk assessment should be undertaken in the event of a request for a CPE positive patient to attend holiday dialysis in Scotland.

Identification of a confirmed case of CPE may require the identification of contacts for screening. Please refer to Section 3.4 Management of Contacts.

3.4 Management of contacts

KEY MESSAGE: Screening of contacts (based on likelihood of exposure) will help assess whether spread has occurred and will assist with preventing further spread within the hospital.

Provide patient leaflet[11] and obtain samples for testing as per Section 3.2, and based on the likelihood of exposure as follows:

- *Screening of patients in the same setting* is NOT normally required if the case was identified on admission and isolated immediately. Local risk assessment may also be undertaken to indicate if screening is necessary.
- *Screening of patient contacts of a positive case* SHOULD be undertaken if the case had spent time (or remained) in an open ward or bay with other patients before (or despite) having a positive result for CPE.
- *Screening of household contacts and healthcare staff* is NOT required – there is no compelling evidence to suggest that screening the household or healthcare staff to check for colonisation will provide additional benefit in controlling spread in the healthcare setting. Household contacts of CPE cases will be identified as a "suspected case" and screened for CPE if they are admitted to an acute hospital allowing the risk to be managed at that time.

If screening is indicated:

- It is not necessary to isolate contacts whilst awaiting screening results – cohort such contacts if possible and reiterate SICPs including hand hygiene for staff and patients
- Screen all patients in the bay (or ward, if patient has occupied more than one bay) on a weekly basis for 4 weeks after the last case was detected.
- Restrict screening to patient contacts remaining in hospital.

A case contact spreadsheet is provided in Appendix 2 to assist with contact screening.

Should any contact screen positive, they should be managed as **positive case** (refer to Section 3.3 Management of Confirmed Cases)

AND

SICPs and TBPs should be monitored and reinforced among clinical staff

AND

IPCT may request that the whole ward is screened PLUS discharged patients who occupied the bay (or ward, if case occupied more than one bay) at same time as the case (see Section 8.3, Management of outbreaks and clusters).

4. Environmental cleaning and decontamination

KEY MESSAGE: CPE can be eliminated from the environment by appropriate decontamination as set out in the NIPCM.[10]

Section 2.3, “Safe Management of the Care Environment” of the NIPCM[10] details routine environmental decontamination and terminal decontamination.

5. Microbiology Testing

Testing should be undertaken according to the methods currently recommended by the Scottish Microbiology and Virology Network (SMVN).

6. Treatment

KEY MESSAGE: Treatment of a patient with an infection caused by CPE should be acted upon under the advice of the microbiologist.

If the patient is colonised:

- no antibiotic treatment is required for colonisation
- decolonisation is NOT advised for the following reasons:
    - Skin decolonisation- is not advised as these bacteria generally colonise the gut rather than the skin
    - Gut decolonisation (by prescribing antibiotics) – is not advised as although antibiotics may provide some benefit, there is concern that their use would contribute to increasing resistance in the longer term.
- advise patient of the need for good hand hygiene, especially if they develop loose stools or diarrhoea (for any reason).

If the patient develops an infection:

- ensure treatment is started promptly
- treatment should be guided by susceptibility results and under the advice of the microbiologist.

Note: For further advice about treatment please refer to the current Scottish Antimicrobial Prescribing Group (SAPG) guidance on the treatment of CPE and other multi-resistant Gram-negative infections.[12]

7. Communications

KEY MESSAGE: Robust healthcare communications (within and between acute, non-acute/community settings) are crucial in implementing a successful concerted effort to prevent and control spread.

Commence communications as soon as the first suspected or confirmed case comes to light.

- Maintain communications within your organisation from board level down (including the local laboratory and between departments)
- Alert neighbouring hospitals and providers to allow them to put the necessary precautions and level of alertness in place to prevent spread
- Ensure good communication with receiving organisations *prior to* patient transfer or discharge and with all healthcare professionals along the patient pathway. This includes:
    - The family and / or care facility to which the patient is to be discharged to providing an accurate explanation of risk in a non-acute/community setting, IPC management advice and an opportunity for questions
- Carefully plan *well in advance* of the patient's movements and discharge / transfer discharge

Communication is required between:

<u>The patient</u> so that they understand on discharge:

- their current status (e.g. infection cleared but may still be colonised and the need for good hand hygiene
- should a close contact be admitted to hospital/healthcare setting for any reason, they need to inform healthcare staff of their exposure.

<u>Internal colleagues</u>

- the microbiologist and laboratory personnel
- the IPC team to remind ward staff (including domestic and visiting staff) of IPC measures within your CPE Management Plan (Section 8.1)
- your local Health Protection Teams

Healthcare colleagues:

- microbiologists, IPC teams in neighbouring health boards and the community hospitals, care homes, primary care services *especially* the patient's GP plus any other relevant care provider along the patient pathway.
- any boards where there is regular inter-board transfer from one unit to another

External colleagues:

- Health Protection Scotland

Note: There is no reason for discharge to be delayed once an infection has been resolved even if the patient is still colonised. Timely discussion between IPCT and the receiving facility will optimise patient transfer and ensure appropriate arrangements are put in place to provide safe patient care. Good communications will prevent unnecessary anxiety, misunderstanding or confusion for family, carers or healthcare facility receiving the patient.

Part B – intended for use and consideration during the planning and implementation phases at board / executive level

8. Preparedness

8.1 CPE Management Plan (template for local adaptation)

8.2 Hospital/board checklist of actions to prevent and minimise spread of CPE

8.3 Planning checklist for the management of outbreak and clusters

8. Preparedness

Section 8 provides tools to assist boards in preparedness including:

- CPE Management Plan template (Section 8.1)
- Hospital/board checklist of actions to prevent and minimise spread of CPE (Section 8.2)
- Planning checklist for the management of outbreak and clusters (Section 8.3)

8.1 CPE Management Plan (template for local adaptation)

The plan should include:

1. Resource and capacity arrangements

The following arrangements for resources should be considered so that they are available/in place to support the plan including:

- staff to provide capacity when the ward/bays have been closed, patients are in isolation or cohort nursing is underway or enhanced cleaning is required
- equipment to facilitate the above
- facilities to undertake patient screening including the CRA and access to a laboratory which provides timely feedback of results
- a system to flag the positive result (colonisation or infection) of CPE on the patient's record.

2. Staff training and update arrangements

Initial training and routine updates should be in place for all relevant healthcare and domestic staff to enable a *full understanding* of:

- your CPE Management Plan
- the potential threat of multi-drug resistant organisms, including CPE
- the clinical implications of such resistant organisms
- prudent antimicrobial prescribing
- effective risk assessment as part of the routine admission procedure
- the actions required if a patient is suspected of being infected or colonised by CPE
- SICPs and contact TBPs
- excellent two-way communications internally from board to ward and externally

with other healthcare professionals and organisations

- being alert to the increased risk of infection or colonisation with patient transfers/admissions from outside Scotland
- maintain staff awareness of the changing national and international picture.

A NHS Education Scotland module has been developed to train frontline staff to undertake CRA-based screening including CPE. This will be available from the Compendium of Healthcare Associated Infection Guidance.[9]

3. 'Building a picture' to provide a baseline and monitor trends

To support the development and implementation of the CPE Management Plan:

- an understanding is required of the history/epidemiology of CPE and other multi-drug resistant organisms within your organisational setting(s)
- This will provide a baseline, which for most should be zero for carbapenemase-producing organisms i.e. no cases (or at least no transmission) has occurred within the organisation. This baseline will assist in speedy recognition of an emerging problem.

4. Early detection and effective infection prevention and control practices

Plans should be in place to ensure that early management of a suspected/confirmed case prevents on-going transmission to other patients/staff. This plan should cover:

- screening – patient and patient contacts
- provision of single rooms with en-suite facilities (or designated commode if no en suite)
- provision of equipment and supplies to ensure the application of SICPs and TBPs. For example: liquid soap, alcohol-based hand rub, appropriate PPE and suitable cleaning products
- patient movement – as an inpatient or on medical transfer/discharge
- communication with visitors

5. Robust diagnostics / arrangements for laboratory services

Boards should be aware of/agree local arrangements to ensure that the following steps occur in a timely way for the management of patient specimens:

- transport - forewarning laboratory of suspicion of CPE
- transport - rapid transportation of sample from clinical area to laboratory
- receipt of specimens – how this will be managed over a weekend/bank holiday
- processing specimens - how this will be managed over a weekend/bank holiday
- review laboratory standard operating procedures to ensure they are in line with the recommendations of the SMVN
- review laboratory policies on referral to the Reference Laboratory
- reporting of results to the right people in a timely way.

6. Antimicrobial stewardship and treating infections (see Section 5)

- prudent use of antimicrobials
- antimicrobial choice when managing patients with CPE.

7. Planning for dealing with the first case or an increase in cases

Plans need to be in place to coordinate the response on recognition of a problem; the following should be included in the plans:

- internal communications
- external communications including the use of HIIAT and HAI-ORT[9]
- rapid application of CPE Management Plan
- criteria and procedure for instigating and convening an IMT – this will depend on:
    - the scale of the problem
    - whether transmission / spread has occurred in the hospital
    - the 'state of readiness' of the organisation.

8. Effective communications, including discharge and medical (inter-healthcare) transfers

The hospital discharges its 'duty of care' by ensuring that the right people, in the right place, have the right knowledge through planning early communications (see Section 7):

- within the hospital
- with the laboratory
- between healthcare professionals, specialist units and neighbouring healthcare facilities – hospital and non-acute /community
- with healthcare providers *outside* of the area/region which the hospital liaises with on the patient pathway, sporadically or routinely, including other acute hospital or

specialists units

- with the patient, providing leaflets and opportunity to discuss
- with the family and/or care home to which the patient is to be discharged – to provide an accurate explanation of risk in a non-acute/community setting, provide an opportunity for questions and signposting for further advice

NOTE: Communication needs to occur *prior to* the affected patient's transfer or discharge. It is essential that the transfer is carefully planned well in advance (see Section 7).

To ensure this plan can be implemented:

1. Maintain or develop a robust surveillance system

- NHS Boards are required to implement Local Surveillance of Alert Organisms as per HPS Guidance[13]
- ensure risk factor data are collected in line with local and national surveillance.
- microbiologists will coordinate the collection of additional risk factor data as per the SMVN approved list for the national enhanced CPO surveillance system
- discuss surveillance reporting outputs routinely at your IPCT and/or Infection Control Committee meetings to monitor for signs of spread
- repeat independent/sporadic cases may be a feature in some care settings e.g. admission from abroad to UK referral centres or to UK private hospitals. Keeping a running tally may be helpful.

2. Assess each case for source

To assess whether colonisation or infection could have been acquired in the hospital, consider whether the patient:

- met the criteria for a suspected case on admission (Section 3.1)
- has recent history of being an inpatient in another hospital.

If not, consider:

- whether the positive sample was collected more than 48 hours after admission (particularly if a previous pre-48 hour screen or culture was negative) *and/or* the patient has been an inpatient in your hospital recently
- undertaking *root cause analysis* for in-depth investigation; communicate rapidly to

the inward transferring healthcare facility (if appropriate) if your risk assessment indicates that facility was the possible/likely source for the patient's infection or colonisation.

3. Review IPC practices especially if there is suspicion or evidence that the infection or colonisation was acquired within your organisation. A daily Infection Prevention and Control Checklist is provided in Appendix 3.

4. Review laboratory arrangements and diagnostics.

5. Ensure an electronic system is in place for flagging the patient's CPE status; avoid acronyms that may be misconstrued by others who use different acronyms.

6. Prepare to detect and deal with an increase in cases or a *suspected cluster:*

- maintain effective surveillance and scrutiny of data relating to unusual isolates and trends
- identify effective cascade methods, if one or more cases are detected, for rapid reminders of strict adherence to CPE Management Plan
- include in plan, local arrangements for convening an IMT (see Section 8.2)

8.2 Hospital/board checklist of actions to prevent and minimise spread of CPE

Board Engagement	Number of cases		
	0	**1**	**>1**
Board to make it a high priority to minimise spread and to support all infection prevention and control (IPC) measures.	✓	✓	✓
Prepare a dedicated management plan (Section 8.1).	✓		
Hospital wide			
Run awareness/training campaign for staff especially, but not exclusively, medical and nursing staff.	✓	✓	✓
On admission, screen suspected cases (Section 3.2).	✓	✓	✓
Implement isolation strategy at triage/admission for suspected or recent laboratory-confirmed patients.	✓	✓	✓
Hold regular incident management team meetings to review epidemiology and IPC strategies, including root cause analyses where applicable. (Following local risk assessment, it may be determined that there is not a need for an IMT for a single case of CPE).		✓	✓
Implement communication strategy; HIIAT assess and take action as per HIIAT SOP. (Following local risk assessment, it may be determined that there is not a need to complete a HIIAT for a single case of CPE).		✓	✓
Ensure that any transmission becomes a top board priority, with leadership from board to ward.			✓
Laboratory			
Optimise and review laboratory methods to detect producers.	✓	✓	✓
Ensure laboratory standard operating procedures are in line with the recommendations of the SMVN.	✓	✓	✓
Infection prevention and control			
It is recommended that the IPCT ensure that the incident/problem is raised at board level. (Following local risk assessment, it may be determined that there is not a need to raise at board level for a single case of CPE).		✓	✓
Implement the CPE Management Plan immediately, with application of SICPs and contact TBPs; affected patients should be isolated in a single room with en-suite facilities or dedicated commode.		✓	✓
Optimise care bundles and clinical practice for indwelling devices (review the need for the latter).	✓	✓	✓
Reinforce and optimise hand hygiene with soap and water or, on *visibly clean hands only,* alcohol-based hand rub as an alternative.	✓	✓	✓
Minimise spread by effective routine and terminal cleaning including all hand-contact and sanitary areas (increase frequency if evidence of spread); review procedures for effective decontamination of equipment.		✓	✓
Designate cohort staffing depending on risk assessment, number of cases and feasibility.			✓
Ensure effective incident tracking via a robust surveillance system, with an IMT, full epidemiological investigation, maintaining line list and epidemic curve. (Following local risk assessment, it may be determined that there is not a need for an IMT for a single case of CPE).		✓	✓
Ensure collection of additional risk factor data for enhanced surveillance system for each case.		✓	✓
Prepare a readmission, discharge and transfer strategy for affected patients and	✓	✓	✓

contacts.			
Plan and facilitate adequate communication to other healthcare providers (intra- and inter-regionally).	✓	✓	✓
Screening			
Screen index case and case-contacts as per criteria; case find and isolate cases immediately; determine the extent of spread; convene an IMT if spread suspected; electronically flag affected patient(s) record.		✓	✓
Instigate weekly screening of all patient contacts (as identified) in affected units / wards for a period of 4 weeks after the last case was detected; cohort contacts if possible / feasible		✓	✓
Screening of staff or household members is NOT routinely recommended as it is unlikely to provide additional benefit to control measures, whereas promotion of SICPs and contact TBPs will.		✓	✓

8.3 Planning checklist for the management of outbreak and clusters

1. Early communications

- The infection control manager (ICM), senior infection control nurse (ICN) or infection control doctor (ICD) should alert the senior hospital management and key senior clinical/ward staff
- The ICM, ICN or ICD should report the Healthcare Infection Incident Assessment Tool[9] (HIIAT) status to HPS, according to the SOP.

2. Instigation of immediate control measures

- Immediately refer to your dedicated plan (Section 8.1) for the management of CPE
- Apply the advice within this toolkit to ensure all early control measures to prevent spread have been instigated

3. Convene an incident management team (IMT)

Suggested members of the IMT:

- Infection control leads – clinician, nurse and manager
- Microbiologist
- Hospital executive representation
- Clinical representation and senior nurse manager
- Estates/domestic service representation
- Communications department
- Pharmacy/medicines management team
- Representative from the local HPT (if appropriate/required)
- Representative from HPS (if appropriate/required)

4. IMT review:

- Line list of cases – produce and maintain an epidemic curve (or running tally for repeat sporadic cases
- Microbiological investigations to date – diagnostic and screening, plus results
- Epidemiological investigations to date including characterisation of time, place, person epidemiology

- Current hypothesis(es) for incident/outbreak/cluster
- Control measures to date and effectiveness, include compliance/audit history
- Antimicrobial practices and compliance with policies
- Staff training and awareness

5. IMT produce incident outbreak control plan including:

- Agreement on leadership, roles and responsibilities
- Frequency of meetings and reporting schedule (may change over time)
- Action plan for ongoing investigations and control measures (include timelines)
- Monitoring and reinforcing SICPs and TBPs
- Plans for maintaining and reinforcing cleaning schedule as described in the NIPCM[10]
- Transfer and discharge arrangements for affected patients
- Additional expert advice required
- Consideration of external expert or peer support visit in 'difficult to control' outbreaks
- Communications strategy including patients, relatives, the media and additional professionals/organisations as outlined in 6, below).

6. Communications

- Inform/update IPCT and microbiologists of neighbouring hospitals or boards where there is regular inter-hospital transfer from one unit to another (where one unit is affected)
- Inform other healthcare providers/hospitals outside of the area/region that the hospital liaises with on the patient pathway, sporadically or routinely
- Maintain regular liaison with HPS
- Ensure no affected patient is transferred to another healthcare facility without verbal advice and an inter-healthcare transfer form being provided – this includes transfers to care homes, intermediate care or hospices (see Appendix 1)
- Ensure no affected patient is discharged without receiving documentation on his/her status for future reference for other healthcare providers

Part C. Appendices

Appendix 1. Inter-care transfer form

Appendix 2. Case contact spreadsheet

Appendix 3. Infection Prevention & Control checklist

Appendix 4. Glossary of terms

Appendix 1 Inter-care transfer form template

Notification of a patient colonised or infected with a CPE or other multidrug-resistant organism (For local adaptation: for use in conjunction with full discharge / transfer planning)

<table>
<tr><td colspan="2">Patient / client details: (insert label if available)
Name:

Address:

Date of birth:

CHI:</td><td colspan="2">Consultant:

Specialty:

Contact no:

GP:

Contact no:</td></tr>
<tr><td colspan="2">Transferring facility (hospital, ward, care home, other)

Contact Name:

Contact No:</td><td colspan="2">Receiving facility (hospital, ward, care home, district nurse [if applicable], GP)

Contact Name:

Contact No:</td></tr>
<tr><td colspan="2">Diagnosis: (confirmed organism)</td><td colspan="2">Infection: YES / NO

Colonisation: YES / NO</td></tr>
<tr><td colspan="4">Microbiological identification (specimen results):</td></tr>
<tr><td>Specimen & Results</td><td>Specimen Type</td><td>Date</td><td>Result</td></tr>
<tr><td>Screen / diagnostic</td><td></td><td></td><td></td></tr>
<tr><td>Confirmatory</td><td></td><td></td><td></td></tr>
<tr><td>Other</td><td></td><td></td><td></td></tr>
<tr><td colspan="4">Treatment Information (if appropriate): (including type of medication, dose and duration)</td></tr>
<tr><td colspan="4">Infection prevention & control precautions required / in place:</td></tr>
<tr><td colspan="4">Other information relevant to patient’s care:</td></tr>
<tr><td colspan="4">Has ambulance service been informed? YES / NO (if no, give reason)</td></tr>
<tr><td colspan="4">Is the patient / client aware of their colonisation / infection status? YES / NO (if no, give reason)

Has patient received information about their status? (Patient leaflet) YES / NO</td></tr>
<tr><td colspan="4">Name of staff member completing form:

PRINT NAME: CONTACT NUMBER:</td></tr>
</table>

Appendix 2. Case-contact spreadsheet (template for local adaptation).

Date first case identified:	Hospital name and address:					Key contact details:	
Count of cases (colonised or infected) as of: __/__/__ *(insert date)*							
Total number of presumptive (locally confirmed) cases	Total number of cases confirmed by reference laboratory	Total number (suspected and confirmed) remaining as inpatients	Total number of deaths	Comments			
Case details							
Name	DOB/CHI	Sex	Ward/Bay/Bed space	Status- A (alive), D (dead)	Criteria for suspected case†	Number of contacts screened	Number of contacts screened positive for same strain

† In last 12 months has patient: been hospitalised outside of Scotland; received renal dialysis outside of Scotland; been a close contact (living in the same house; sharing the same sleeping space (room or hospital bay); or a sexual partner)
Case – history of being a confirmed case (colonised or infected) in last 12 months; Contact - contact with a known case (whether colonised or infected) in last 12 months

Appendix 3. Infection Prevention & Control checklist

	DATE					
Patient Placement/Assessment of risk	Patient placement is prioritised in a suitable area pending investigation i.e. single room with clinical wash hand basin and en-suite facilities.					
	Cohort areas are established if multiple cases of the same infection are confirmed or if single rooms are unavailable. (Patients should be separated by at least 3 feet (1m) if cohorted).					
	Doors to isolation/cohort rooms/areas are closed and signage is clear (undertake a patient safety risk assessment for door closure).					
	If failure to isolate, inform IPCT. Ensure all patient placement decisions and assessment of infection risk (including isolation requirements) is clearly documented in the patient notes and reviewed throughout patient stay.					
	Patient placement has been reviewed.					
Standard Infection Control & Transmission Based Precautions	**Hand hygiene**					
	All staff using correct technique for hand washing (see appendix 1 of NIPCM).					
	All staff/visitors are washing hands with non-antimicrobial liquid soap and water if: • hands are visibly soiled or dirty; or • caring for a patient who also has a suspected or known gastro-intestinal infection **otherwise** using ABHR during routine care					
	Personal Protective Clothing (PPE)					
	Staff are wearing disposable aprons and gloves for direct care contact or when in the patients immediate care environment and changed between patients and/or following completion of a procedure or task.					
	Safe Management of Care Equipment					
	Single-use items are in use where possible.					
	Dedicated reusable non-invasive care equipment is in use and decontaminated between use and prior to use on another patient.					
	Safe Management of the care environment					
	All areas are free from nonessential items and equipment.					

	At least daily decontamination of the patient isolation room/cohort rooms/areas is in place using a combined detergent/disinfectant solution at a dilution of 1,000 parts per million (ppm) available chlorine (av.cl.).					
	Increased frequency of decontamination is incorporated into the environmental decontamination schedules for areas where there may be higher environmental contamination rates e.g. “frequently touched" surfaces such as door/toilet handles and locker tops, over bed tables and bed rails.					
	Terminal decontamination is undertaken following patient transfer, discharge, or once the patient is no longer considered infectious.					
Information & Treatment	Patient informed of all screening/investigation result(s).					
	Patient Information Leaflet provided and explained.					
	Education given at ward level by a member of the IPCT on CPE.					
	Ward staff provided with information sheet on CPE.					
	Antimicrobial therapy reviewed by patient’s medical team.					

Appendix 4. Glossary of terms

Glossary	
acute care setting	Provide a wide range of specialist care and treatment for patients. Typically, services offered in the NHS Acute sector are diverse. They include: consultation with specialist clinicians (consultants, nurses, dieticians, physiotherapists and a wide range of other professionals); emergency treatment following accidents; routine, complex and life saving surgery; specialist diagnostic procedures; and close observation and short-term care of patients with worrying health symptoms.[14]
carbapenemases	Enzymes (such as KPC, OXA-48, NDM and VIM) produced by some bacteria which cause destruction of the carbapenem antibiotics, resulting in resistance.
close contact	A person living in the same house; sharing the same sleeping space (room or hospital bay); or a sexual partner.
colonisation	The presence of micro-organisms living harmlessly on the skin or within the bowel and causing no signs or symptoms of infection.
confirmed case- *for the purposes of this guidance*	Patient who has ever tested positive for CPE either from a screening sample or from a routine clinical sample during this or previous admission episodes
infection	The presence of micro-organisms in the body causing adverse signs or symptoms
inpatient	Patient who is admitted to an available staffed bed in a hospital (either electively or as an emergency) and either remains overnight whatever the original intention or is expected to remain overnight but is discharged earlier.[15]
rectal swab	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 to enable organism detection in the laboratory. A rectal swab *should not* be mistaken for a perineal swab.
suspected case- *for the purposes of this guidance*	A patient who, in the previous 12 months, has one or more of the following: been an inpatient in a hospital outside of Scotland; received holiday dialysis outside of Scotland; been a close contact of a person who has been colonised or infected with CPE

9. References

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