University Hospitals of Leicester NHS
NHS Trust

Carbapenem Resistant Organisms (CRO) and Extensively Drug Resistant Organisms (XDR) UHL Infection Prevention Policy

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Trust Lead:	Elizabeth Collins, Lead Nurse Infection Prevention
Board Director Lead:	Julie Hogg, Chief Nurse and DiPac
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REVIEW DATES AND DETAILS OF CHANGES MADE DURING THE REVIEW

Guideline changed to a policy, content reviewed and updated, references and appendices updated.

KEY WORDS

CRO, CPE, Carbapenem Resistant Organisms, XDR, TBPs

1 INTRODUCTION AND OVERVIEW

1.1 Antimicrobial resistance (AMR) is the ability of bacteria to resist the killing effect of antibiotics and other antibacterials. AMR has been an increasing problem ever since the introduction of penicillin antibiotics in clinical use in the 1940s, Up until the 1980s, the problem of resistance was mostly tackled by using new antibiotic classes (e.g. cephalosporins, carbapenems, aminoglycosides, and quinolones). However, the discovery of new antibiotic classes has dwindled over the last forty years and the last new class of antibiotics to enter clinical practice was discovered in 1987. Bacteria that are resistant to many and in some cases all, antibiotics are increasingly encountered in clinical practice, leading to infections that are difficult or impossible to treat.

1.2 Some types of resistance can be shared between bacteria by transfer of resistance genes on small pieces of DNA called plasmids. Some plasmids carry resistance to many different antibiotic classes.

1.3 The onset of resistance to multiple antibiotic classes has led to bacteria being described by the extent of their resistance. Multi-drug resistant (MDR) bacteria are bacteria that are resistant to at least one antibiotic in three or more antibiotic families. Extensively-drug resistant (XDR) bacteria are resistant to at least one antibiotic in all but two or fewer antibiotic families. Pan-drug resistant (PDR) bacteria are resistant to all antibiotics.

1.4 Resistance to many antibiotic classes are especially concerning when it occurs in common causes of severe infection. This is the case for resistance in Escherichia coli and Klebsiella pneumoniae, the first and third most frequent causes respectively of bloodstream infection/sepsis. In common with many other hospitals, UHL has experienced a large increase in infections caused by resistant strains of these bacteria over the last five years. In particular, the number of cases of colonisation and infection caused by strains resistant to the carbapenem antibiotic class has risen alarmingly since 2018. Carbapenem antibiotics, such as meropenem, are often described as the last line of defence, so that when common bacterial pathogens are resistant to carbapenems, there are few treatment options left.

1.5 Carbapenem resistance can occur through a range of mechanisms, depending on the affected bacteria. Carbapenem resistance in Pseudomonas aeruginosa is a frequent occurrence and almost always due to inability of the carbapenem antibiotic to get into the bacterial cell. While this can cause treatment difficulties, carbapenem-resistance in Pseudomonas also carries a cost for the Pseudomonas meaning that resistant strains often lose in competition against sensitive Pseudomonas strains.

1.6 Carbapenem resistance in E coli and Klebsiella species is often due to the acquisition of a plasmid carrying a carbapenem resistance gene that codes for an enzyme called carbapenemase. There are many different carbapenemase enzymes but the most frequent five are:

OXA-48

KPC

NDM-1

VIM

IMP1

1.7 Carbapenem resistance can only be detected in the Microbiology laboratory and requires a number of tests to first of all identity carbapenem-resistant organisms and then work out the underlying resistance mechanism. Different names are used to describe carbapenem resistance. In Leicester, carbapenem resistant organisms are all called CROs regardless of whether the resistant organism is a Pseudomonas aeruginosa, with resistance due to poor penetration, or a member of the Enterobacterales group of bacteria (e.g. E coli, Klebsiella pneumoniae) where resistance is due to carbapenemase. When the lab identifies that that CROs are resistant to carbapenems because they produce carbapenemase, the term carbapenemase-producing Enterobacterales (CPE) may be used as a more specific description. So, all CPEs are CROs but not all CROs are CPEs.

1.8 CPEs are frequently resistant to very many other, unrelated, antibiotic classes so will also be described as XDR. There have been some strains that are PDR.

1.9 Enterobacterales bacteria like E coli and Klebsiella pneumoniae are normal residents of the large bowel. Everyone carries these bacteria in their gut as part of their normal gut flora or microbiota. Most of the time these bacteria cause no harm and possibly even protect against infection by diarrhoea-causing bacteria such as Salmonella. However, occasionally, Enterobacterales bacteria can get into other places including the urinary tract, liver or biliary tract, and may result in bloodstream infection. There are between 40-60 E coli and around 15-25 Klebsiella pneumoniae bloodstream infections in Leicestershire per quarter, most of them with their onset in the community but some starting in UHL. These infections need fast effective treatment if the patient is to survive.

1.10 Because of the resistance of CRO/XDR bacteria to many different antibiotic classes, patients with infections caused by these resistant bacteria may not be treated adequately or quickly enough to avoid infection becoming severe or even fatal.

1.11 UHL has implemented infection prevention measures aimed at identifying patients colonised or infected with CRO/XDR bacteria in order to support prompt isolation, any additional necessary investigations, communication and treatment decisions, as well as personal and environmental hygiene measures. These measures are set out in this policy.

1.12 These measure apply equally to other resistant micro-organisms, including XDR Candida auris

2 POLICY SCOPE –WHO THE POLICY APPLIES TO AND ANY SPECIFIC EXCLUSIONS

2.1 This policy applies to all staff employed within UHL NHS Trust in a permanent or temporary capacity, volunteers and staff working in a contracted capacity and anyone working in a training capacity. This policy sets out the roles and responsibilities of staff for the prevention of infection within the Trust.

2.2 This policy must be followed by all staff employed within University Hospitals of Leicester NHS Trust and staff working in a contracted capacity. The policy is applicable to all patients within UHL including Alliance and satellite areas (i.e. dialysis).

2.3 Support and advice is available to all Trust staff and members of the public through the Infection Prevention Team. UHL staff can contact the team during office hours (0800 - 1600, Monday - Friday) call extension 15448.

2.4 For urgent advice outside office hours (evenings, nights, weekends, and bank holidays) contact the on-call microbiologist via the duty manager.

2.5 Shared email address is: InfectionPrevention@uhl-tr.nhs.uk Questions can be submitted by visiting the Staffroom IP Forum. The public can source information via the Trust External **website.**

3 DEFINITIONS AND ABBREVIATIONS

Colonisation: The presence of micro-organism without tissue damage or invasion

CRO: Carbapenem Resistant Organisms

CRO Contact: Patients that have been in contact (i.e. in the bay of a ward area or ward if patient has occupied more than one bay) with a patient newly identified with an XDR organism or a patient with an XDR alert (patient centre/nervecentre)

CPE: Carbapenemase-producing Enterobacterales

Infection: The presence of micro-organism with tissue damage or invasion

IVF: In vitro fertilisation

TBPs: Transmission based precautions

XDR: An extensively drug resistant organism has non-susceptibility to at least one agent in all but two or fewer antimicrobial categories

4 ROLES – WHO DOES WHAT

4.1 The roles and responsibilities from chief executive and director of infection prevention down through the organisation can be found in the UHL Infection Prevention Policy **B4/2005.**

4.2 The Director of Infection Prevention and Control (DIPAC) is responsible for infection prevention within the Trust.

4.3 The microbiology department is responsible for identifying organisms that fall into the category of CRO/XDR. They are also responsible for ensuring that this is communicated to the infection prevention team (and to the wards out of hours).

4.4 The microbiology department will also provide advice to clinicians on the most appropriate antimicrobial to use for treatment.

4.5 The Infection Prevention (IP) Team will be responsible for notifying the appropriate ward or department and placing a special register alert on patient centre and NerveCentre.

4.6 The IP team will also provide advice and support in identifying appropriate isolation facilities and practice.

4.7 The IP Team will provide training as appropriate to CMG's.

4.8 Ward / Department Staff; Each UHL employee has a responsibility to patients, co-workers and members of the public to ensure that they are aware of their responsibilities towards infection prevention and are aware of the guidelines for the management of patients in the areas in which they work.

5. POLICY IMPLEMENTATION AND ASSOCIATED DOCUMENTS –WHAT TO DO AND HOW TO DO IT

5.1. CRO Screening

5.1.1. All in-patients on admission or pre-assessment will be risk assessed for their colonisation risk using the i-five A-F assessment (**see appendix 1**) in nervecentre or pre-assessment booklet.

5.1.2. Patients with the following risk factors must be screened for CROs within 6 hours of admission and isolated using **enhanced** TBP's until a negative result has been received:

- Patients who have spent at least one night in hospital abroad in the last 12 months
- Patients who have dialysed abroad within the last 12 months
- Patients who have had IVF abroad within the last 12 months
- Patients who have had any other invasive treatment abroad i.e. wound dressings/day surgery in the last 12 months

5.1.3. Patients with the following risk factors must be screened within 6 hours of admission and do not require isolation pending a negative result:

- Patients who have spent one night in a UK hospital including UHL within the last 12 months
- Patients admitted to oncology/haematology
- Patients admitted to adult intensive care units

5.1.4. All pre assessment areas and elective admissions (including day case and Alliance) should follow the same screening process; see **appendix 2** .

5.1.5. All patients with a prior history of CRO/XDR colonisation or infection should be isolated with **enhanced** TBPs on admission for the duration of their stay. They do not need additional CRO screens.

5.1.6. Day case patients undergoing procedures involving the large bowel that have not been screened for CRO must:

- Be risk assessed (see 5.1.1)
- Be isolated with **enhanced** TBPs in a single room
- Be placed last on the list and the clinician undertaking the procedure must be informed
- Refer to CRO/XDR screening flow chart **appendix 2** **.**

5.2. Contact Screening for CRO

5.2.1. If a patient in a bay area is found to be CRO positive, the following actions must be taken:

- Each patient in the same bay should be tested for CRO carriage by CRO PCR rectal swab

- Rectal swabs must be taken weekly from these contacts for up to 4 weeks during their in-patient stay
- Isolation of patient contacts is not required unless the subsequent screens are positive

5.2.2. The frequency of screening may increase if transmission of new cases are detected within the ward area or based on risk assessment of the individual situation

5.2.3. The Infection Prevention team will tag the contact patients' nervecentre record with a CRO CONTACT tag

5.2.4. Bay or ward closure may be recommended when a patient with an XDR alert has not been isolated in a single room and there is evidence of transmission.

5.2.5. The decision to close a bay or ward areas will be made by the Infection Prevention team in conjunction with microbiology and the operational/site team. Refer to **B11/2006** Incidence and outbreak of infection policy.

5.3. Identification of CRO patients

5.3.1. The Microbiology department will identify organisms that are CRO/XDR and inform the Infection Prevention team.

5.3.2. The Infection Prevention team will inform the ward or department concerned and flag patient centre and nerve centre with the XDR alert.

5.3.3. Outside of normal working hours Microbiology will inform the ward or department directly. The Infection Prevention team will also be informed who will flag with an XDR alert in patient centre and nerve centre the next working day.

5.3.4. Healthcare staff looking after the patient is responsible for informing the patient of their result. A CRO patient information leaflet should be provided to the patient by ward staff.

5.4. Management of CRO/XDR Patients and transmission based precautions (TBP's)

5.4.1. Patients that have had an overnight stay in hospital or healthcare treatment abroad in the last 12 months (refer to appendix 2 CRO screening flow chart) will remain in a single room with enhanced TBP's until one negative CRO PCR rectal swab is available.

- If the patient is found to be positive then continue with **enhanced** TBP's for duration of hospital stay.
- TBP Poster available **here.**

5.4.2. Patients who are re-admitted and have previously been identified with a CRO/XDR organism must be placed in a single side room with enhanced TBP's for the duration of their in-patient stay.
- These patients are not to use the discharge lounge

5.4.3. Enhanced TBP's involve all staff entering the patient's room to wear a long sleeved gown and gloves and:

- TBP's are to be maintained throughout the patients inpatient stay
- PPE to be put on prior to entering room (hand hygiene before putting on gloves)
- PPE to be removed in the patient's room and hands decontaminated with soap and water
- Masks and eye protection are not routinely required. Risk assess the need for mask/eye protection if there is a risk of exposure to blood or body fluids.
- If mask/eye protection worn, remove outside the room

5.4.4. Healthcare staff should use and follow the CRO IP pathway for all CRO/XDR patients.

5.4.5. Patients that are transferred from other hospitals should be isolated in a single room in contact TBP's until MRSA screening (including risk factors) results are received. Refer to the MRSA prevention management and screening policy **B12/2015** .

5.4.6. Patients identified with Pseudomonas aeruginosa may be carbapenem resistant through porin loss and/or increased efflux mechanism. Although these isolates are CROs, they do not pose a substantial cross-infection risk and do not require enhanced isolation precautions. Microbiology or the Infection Prevention team will provide advice on appropriate management of these patients.

5.5. Treatment

5.5.1. Antimicrobial treatment must be discussed with Microbiology to ensure that appropriate antibiotics are used if necessary.

5.5.2. Patients colonised with CRO with no evidence of infection should not be treated with antibiotics.

5.6. Movement and Transfer of patients with CRO/XDR

5.6.1. Patient movement between hospital departments or wards (e.g. theatre, X-ray) should be minimised and must only occur where there is clinical need.

5.6.2. Patients requiring assessments i.e. stair/physiotherapy as an inpatient must be assessed for the risk of transmission i.e. incontinence/diarrhoea (type 6 or 7 stool), leaky wounds.

- If no risk identified, assessment can continue
- Ensure patient is wearing clean clothes and performs hand hygiene prior to leaving the room.
- Patients must be transferred on a clean chair or trolley from the department they will be attending and not the bed from their side room as this must receive a RED (HPV) clean before it is taken out from the side room
- Healthcare staff do not need to wear PPE when transferring the patient but must be bare below the elbow and perform appropriate hand hygiene

5.6.3. The receiving department must be informed prior to the visit so that enhanced TBP's can be taken.

5.6.4. Areas receiving patients with a CRO/XDR alert (e.g. patient to be transferred to another acute or community hospital or nursing/residential home), must be informed and the 'request for discharge support referral' is to be used to document any infection prevention alerts.

5.6.5. If patients are being transferred by the ambulance service, the ambulance service must be informed of the XDR/CRO alert prior to transfer.

5.7. Discharge and Cleaning requirements

5.7.1. Discharge cleaning following discharge of patients with a CRO/XDR alert requires a RED clean which involves Chlorclean, Hydrogen Peroxide Vapour (HPV) and curtains changed.

5.7.2. Upon patient discharge, all foam and hybrid mattresses are to be unzipped and checked for visual marking on patient contact areas (excluding along zip line). Follow the **mattress inspection flow chart** for further details.

- If a mattress requires disposal, complete the **equipment disposal form**.
- Contact facilities helpdesk on 17888 to request a RED HPV clean
- There is a post infection ward cleaning protocol available in the Healthcare environment cleaning policy **B36/2010**
- If any inpatient area experiences problems with the HPV not being carried out, a DATIX must be completed.

5.7.3. HPV is currently not used in the following areas, alternate methods described below for discharge cleaning:

- Emergency Department at LRI (not including assessment areas): use Chlorclean and ultra violet C
- Renal dialysis unit at Leicester General Hospital: use Chlorclean and ultra violet C
- Renal satellite units, imaging (i.e. CT scan, MRI, and X-ray): use Chlorclean.

5.8. Visitors

5.8.1. Patients with a CRO/XDR alert can receive visitors.

5.8.2. All visitors need to be informed of the importance of hand hygiene by staff on leaving the side room and to use the alcohol hand sanitiser outside the side room.

- A hand hygiene leaflet for patients and visitors is available **here** .

5.8.3. Visitors are not routinely expected to wear gloves and gowns unless they are providing personal care.

- If the visitor is required to wear PPE for personal care then it is the duty of the ward staff to explain/show the visitor how to don and doff correctly
- Explain that gloves and gowns to be disposed of inside room

5.9. Outpatients Areas

5.9.1. For patients with a known CRO/XDR alert that attend outpatient areas where an invasive procedure is performed (e.g. catheterisation, aspiration of body fluids, local anaesthetic procedure and wound review/dressing change) enhanced TBP's must be followed.

5.9.2. For patients with a known CRO/XDR alert that attend outpatient areas where there are no invasive procedures i.e. physiotherapy, occupational therapy

standard infection control precautions (SICP's) must be followed and isolation is not required.

5.9.3. For patients with a known CRO/XDR alert who are having procedures which include phlebotomy, intra-muscular/ intravenous injections, and standard infection control precautions (SICP's) must be followed and isolation is not required.

5.9.4. If further individual patient management is required, contact the Infection Prevention team for advice.

6 EDUCATION AND TRAINING REQUIREMENTS

6.1 The Infection Prevention team will cascade awareness of the CRO/XDR guideline via CMG Infection Prevention meetings, link staff network, the Infection Prevention newsletter and Insite home page.

6.2 Delivering infection prevention training within UHL including E-learning, workbooks, formal group sessions and practical demonstrations. Each CMG can utilise one or more to provide a blended approach of practical and theoretical information delivery.

6.3 For more in-depth education on CRO management please send requests to infectionprevention@uhl-tr.nhs.uk

7 PROCESS FOR MONITORING COMPLIANCE

7.1 POLICY MONITORING TABLE

Element to be monitored	Lead	Tool	Frequency	Reporting arrangements Who or what committee will the completed report go to.
Transmission based precautions audit	Lead Nurse Infection Prevention	Infection Prevention Combined Audit Report	Biannual	CMGs' IPOG Meetings TIPOG TIPAC
Hand Hygiene Compliance at ward/department level	Heads of nursing/Clinical Directors	Hand Hygiene audit tool	Monthly	CMGs' IPOG Meetings TIPOG TIPAC
Cleaning and decontamination: Audit	Decontamination Lead	Decontamination audit tool	Annually	CMGs' IPOG Meetings TIPOG TIPAC
Cohort nursing during outbreaks	Lead IP Nurse	Cohort Audit	If required during outbreaks	CMGs' IPOG Meetings Outbreak meetings

8 EQUALITY IMPACT ASSESSMENT

If the policy will have any impact on equality, this should be described here. Otherwise the statements below should be inserted (see section 6.6 of the UHL Policy for Policies for more detail):

8.1 The Trust recognises the diversity of the local community it serves. Our aim therefore is to provide a safe environment free from discrimination and treat all individuals fairly with dignity and appropriately according to their needs.

8.2 As part of its development, this policy and its impact on equality have been reviewed and no detriment was identified.

9 SUPPORTING REFERENCES, EVIDENCE BASE AND RELATED POLICIES

Framework of actions to contain carbapenemase-producing Enterobacterales UKHSA September 2022 Actions to contain carbapenemase-producing Enterobacterales (publishing.service.gov.uk)

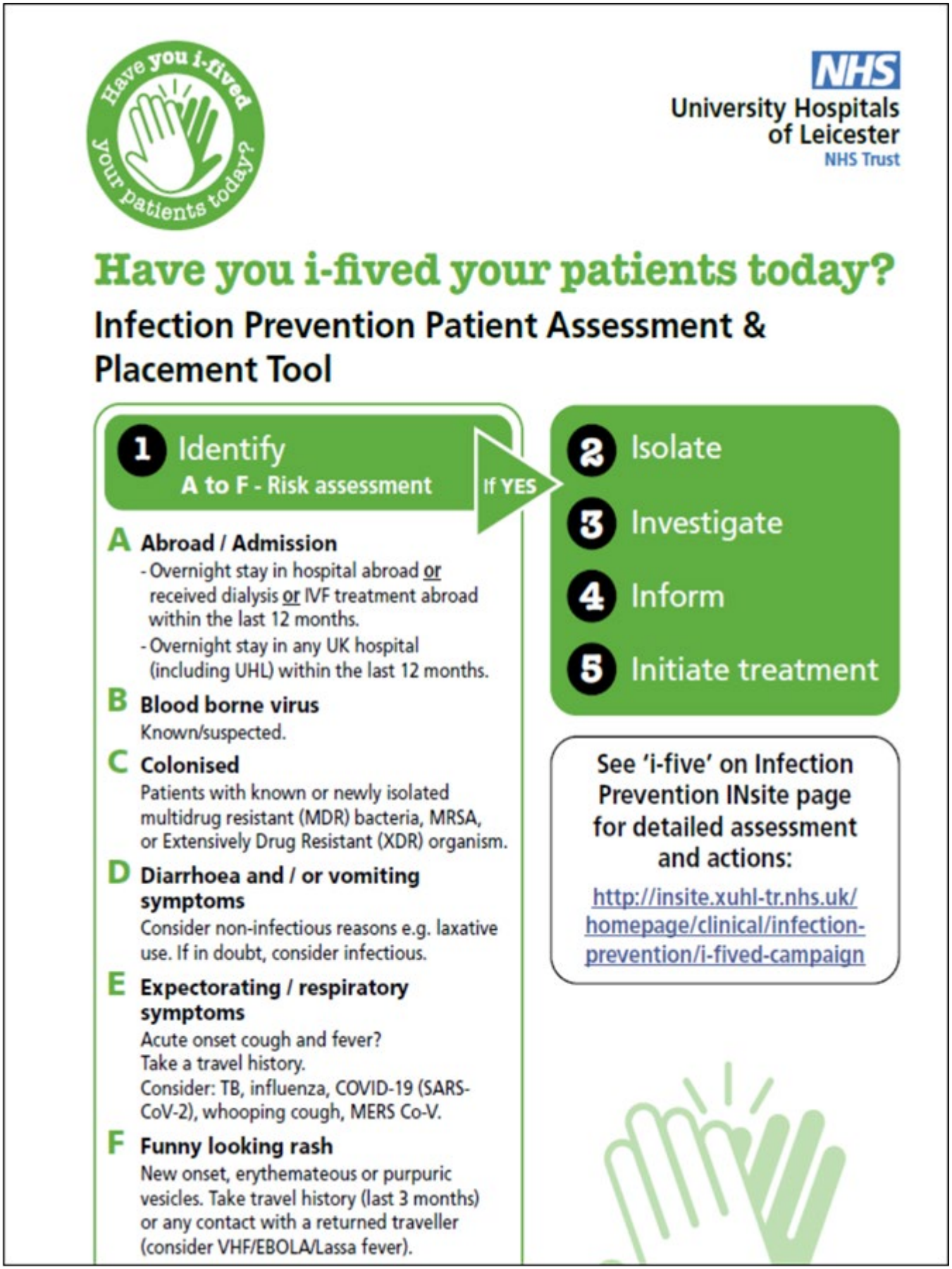
National infection prevention and control manual (NIPCM) for England April 2022 NHS England » National infection prevention and control manual (NIPCM) for England

10 PROCESS FOR VERSION CONTROL, DOCUMENT ARCHIVING AND REVIEW

The updated version of the Policy will then be uploaded and available through INsite Documents and the Trust's externally-accessible Freedom of Information publication scheme. It will be archived through the Trust's PAGL system.

Plans for Implementation and Dissemination include:

- Via CMG infection prevention operational groups
- Via Trust Infection Prevention Operational Group (TIPOG)
- Via dissemination by Infection prevention team
- Dissemination to link staff
- News on Insite



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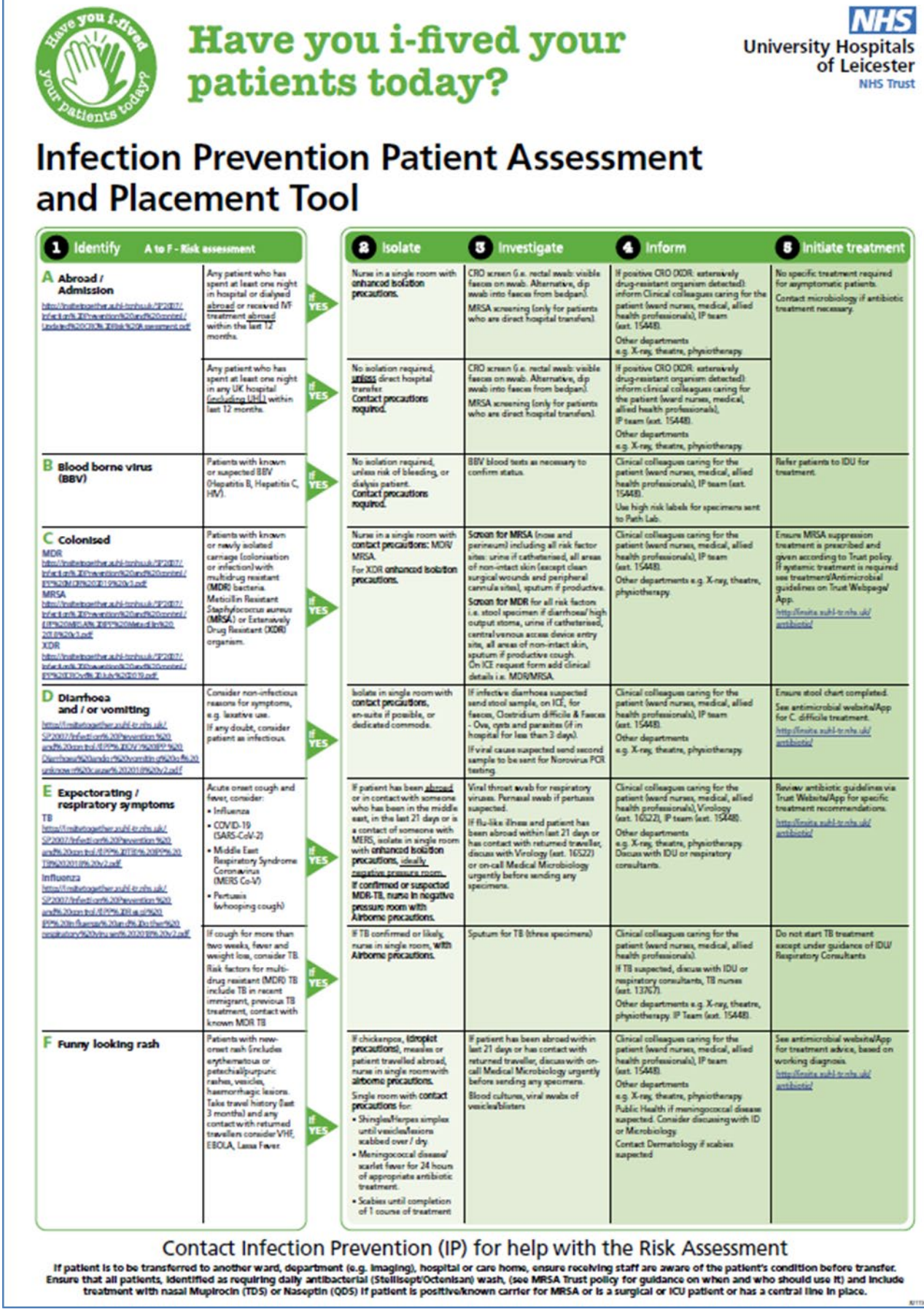

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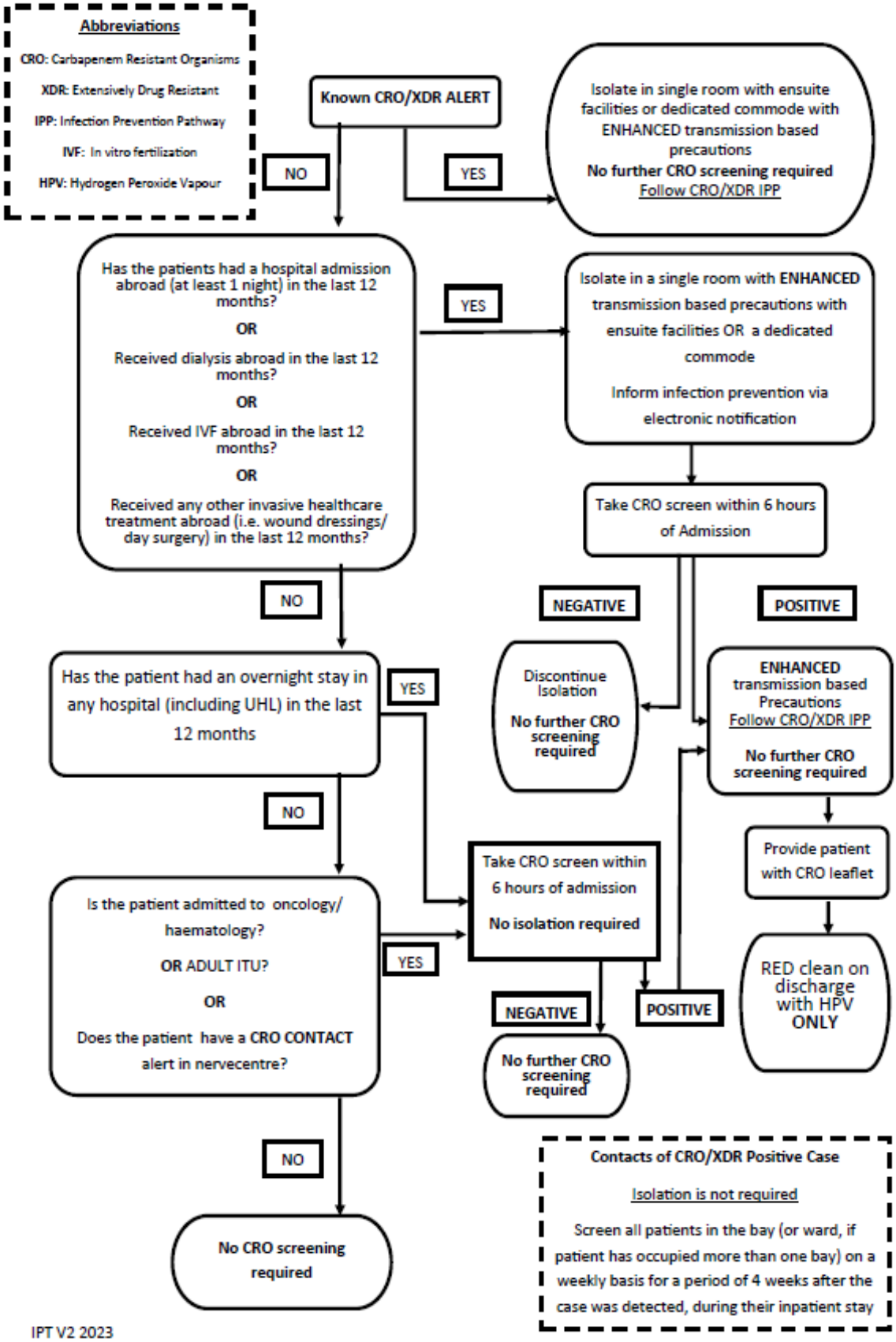
CRO/XDR Screening Flow chart



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