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Canadian Nosocomial Infection Surveillance Program (CNISP)

Surveillance Protocol for Carbapenemase-Producing Organisms (CPO)

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We would like to express our sincere appreciation to Robyn Mitchell of our team, whose significant contributions were instrumental in the development of this protocol.

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BACKGROUND

Carbapenems are a class of beta-lactam antibiotics with broad-spectrum activity recommended as first-line therapy for severe infections caused by certain gram-negative organisms and as directed therapy for organisms that are resistant to narrower spectrum antibiotics. Carbapenem resistance can be due to changes in the permeability of the organism to the antibiotic and/or the up-regulation of efflux systems that "pump" the antibiotic out of the cell, usually concomitant with the presence of an acquired extended-spectrum beta-lactamase (ESBL) or AmpC enzyme or the hyperproduction of intrinsic chromosomally located beta-lactamase(s).

More recently, resistance is increasingly due to the acquisition of enzymes that break down the carbapenems: carbapenemases. These latter subsets of carbapenem-resistant organisms are called carbapenemase-producing organisms (CPOs) and are of particular concern because of their ability to transfer resistance easily across different genera and species of bacteria. They are quickly becoming a public health problem not only because of the ability to cause healthcare acquired infections which have limited treatment options, but because of the potential for colonizing both inpatient and outpatient populations due to their ease of transmissibility, thus, creating a reservoir of bacterial resistance.

The intent of this surveillance is to describe the epidemiology, microbiology and clinical outcomes of patients identified as harboring a carbapenemase. There is a specific focus on this subset of organisms that are carbapenemase producers because they are associated with transmission and outbreaks in health care facilities. We need to continue to monitor the spread of CPOs across Canadian hospitals to inform infection prevention and control programs and patient treatment strategies.

OBJECTIVES

1. To identify and describe the epidemiology, risk factors and clinical outcomes of patients (inpatients, emergency room (ER) patients and outpatients) infected or colonized with a carbapenemase-producing organism (CPO), specifically carbapenemase-producing *Enterobacterales* (CPE) and carbapenemase-producing *Acinetobacter* (CPA) in participating CNISP hospitals.

2. To describe the molecular epidemiologic information of the carbapenemase-producing isolates collected, including the resistance genes present and the organism identified.

3. To determine the incidence of patients infected and colonized with a CPO, specifically CPE and CPA in participating CNISP hospitals.

4. To provide national benchmark rates that hospitals may use for external comparison.

METHODS

Site Eligibility

All CNISP hospitals are eligible to participate.

Case Eligibility

i. Patient admitted to a CNISP participating hospital or presenting to a CNISP hospital emergency department or a CNISP hospital-based outpatient clinic.

ii. Laboratory confirmation of carbapenem resistance or carbapenemase production in *Enterobacterales* and *Acinetobacter spp* (Appendix 1).

NOTE: *Following molecular testing, only isolates determined to be harboring a carbapenemase will be included in surveillance.*

All patient specimens with eligible *Enterobacterales* and/or *Acinetobacter spp* (Appendix 1) will be identified by the hospital microbiology laboratory and sent to the NML with a minimum data set (Appendix 2) for detection or confirmation of carbapenemase production. Laboratories who perform their own molecular testing should submit to the NML only isolates which are confirmed to produce carbapenemases, or which they suspect contain a carbapenemase not detected by their testing.

If there are multiple isolates from one patient:

- where the same gene AND the same organism were identified, please only send one isolate
- for laboratories who are only sending one isolate, please submit the isolate from the most invasive specimen, and otherwise please submit all isolates.

Table 1. Examples of inclusion criteria for patients with multiple samples collected

Patient	Sample	Surveillance Year	Carbapenemase	Species	Site	Inclusion	PID
1	A	2024	NDM	E. coli	Stool	No	
	B	2024	NDM	E. coli	Blood	Yes	99Z-24-001A
2	A	2024	KPC	K.pneumoniae	Stool	Yes	99Z-24-002A
	B	2024	OXA-48	K.pneumonaie	Stool	Yes	99Z-24-002B
3	A	2024	KPC	K. oxytoca	Stool	Yes	99Z-24-003A
	B	2024	KPC	E. cloacae	Urine	Yes	99Z-24-003B
4	A	2024	KPC	K.pneumoniae	Stool	Yes	99Z-24-004A
	B	2024	KPC	K.pneumonaie	Stool	No	-
5	A	2024	KPC	K.pneumoniae	Stool	Yes	99Z-24-005A
	A	2025	KPC	K.pneumonaie	Stool	Yes	99Z-25-001A
6	A	2024	NDM	E.coli	Sputum	Yes	99Z-24-006A
	B	2025	NDM	E.coli	Skin/soft tissue	Yes	99Z-25-002A
7	A	2024	OXA-48	E.coli	Stool	Yes	99Z-24-007A
	B	2024	OXA-48	E.coli	Stool	No	-
	C	2024	OXA-48	E.coli	Blood	Yes	99Z-24-007C
8	A	2024	OXA-51	A.baumannii	Wound	Yes	99Z-24-008A
	B	2024	KPC	E. cloacae	Urine	Yes	99Z-24-009A

Please assign a unique patient identifier as follows: CHEC site number, 2 digit surveillance year, then consecutive number (e.g. 99ZYY001).

NOTE: *When multiple isolates are submitted for the same patient in the same surveillance year, please indicate by adding a suffix A or B etc. to the case number (e.g. 99ZYY001A and 99ZYY001B).*

NOTE: *If a CPE and a CPA are identified in the same patient, please enter them as two separate cases with separate unique PIDs (e.g., 99ZYY001A and 99ZYY002A).*

NOTE: *When the same patient is identified in a different surveillance year, please assign the isolate a new PID (e.g. 99ZYY001) and submit the isolate as per Table 1.*

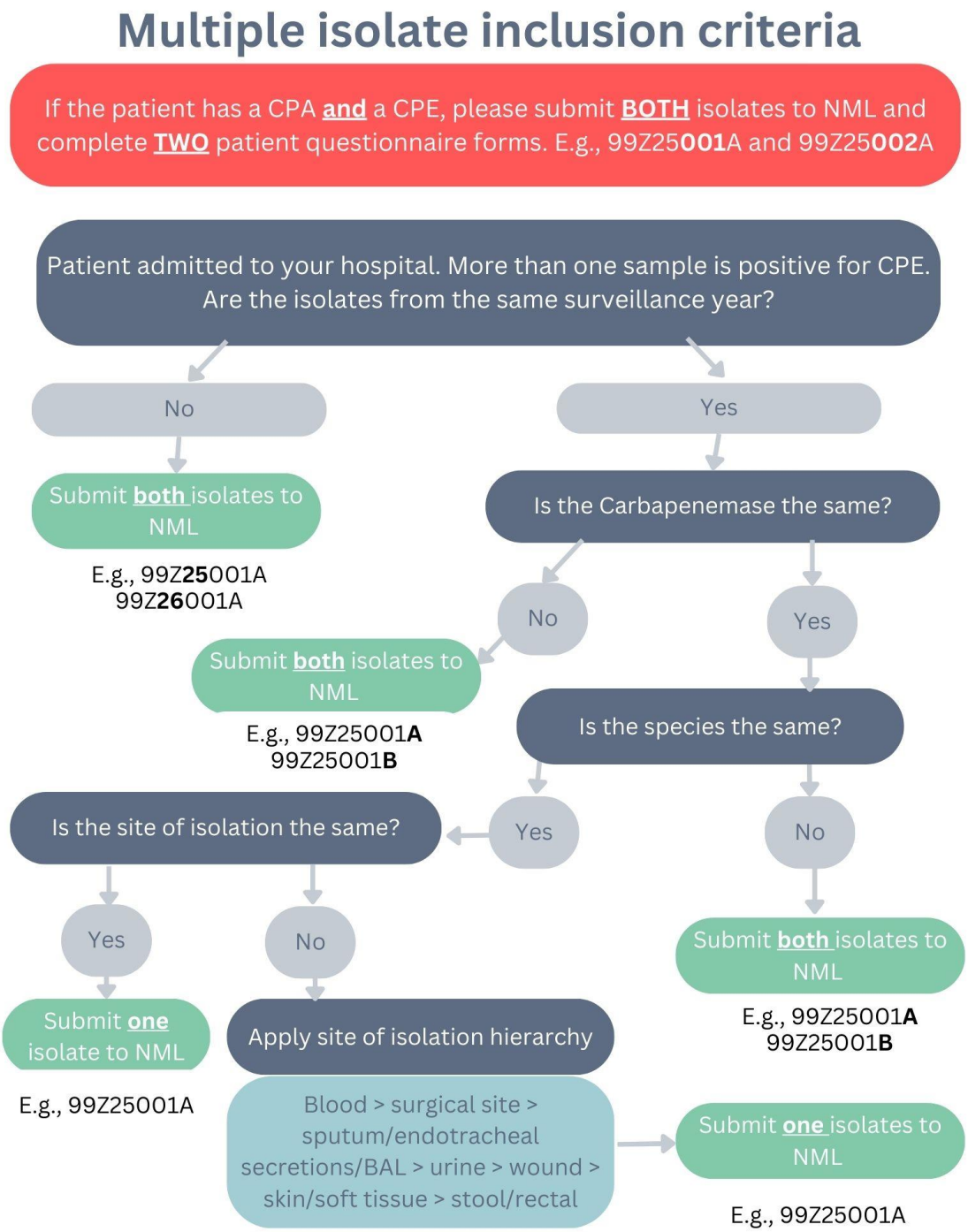


Figure 1. Flow chart to determine which CPE isolates to submit to NML when there are multiple isolates from the same patient and their naming convention

Case Identification and Submission

The NML will email carbapenemase testing results to each hospital which may be used to confirm the hospital's own molecular testing or if the hospital does not do molecular testing this report will indicate for which isolate(s) to submit a patient questionnaire (Appendix 3).

Exposure classification

Once the patient has been identified with a CPO (date of positive culture), they will be classified based on the following criteria and in accordance with the best clinical judgement of the healthcare and/or infection control practitioner (ICP). See Appendix 5 for help determining exposure classification.

	Days of admission			
Calendar day	1	2	3	4
Time (hours)	0-23	24-47	48-71	72-95

Healthcare-associated acquired in your acute-care facility (HA-YAF)*

- Patient is on or beyond calendar day 3[1] of their hospitalization

  OR

- Has had a healthcare exposure (inpatient or outpatient) at your facility that would have resulted in this infection or colonization (using best clinical judgement)

**If a patient tests positive on or after calendar day 3 but are known to have a recent healthcare exposure out of country in an area with endemic CPO, please use best clinical judgement (e.g., admission screening) when determining HA-YAF or HA-OTHER, OUTSIDE OF CANADA.*

HA-YAF Newborn case definition

- The newborn is on or beyond calendar day 3[1] of their hospitalization **AND**
- The mother was **NOT** known to be CPO positive on admission and there is no epidemiological reason to suspect that the mother was colonized prior to admission **AND**
- In the case of a newborn transferred from another institution, CPO may be classified as HA-YAF if the organism was **NOT** known to be present and there is no epidemiological reason to suspect that acquisition occurred prior to transfer

Healthcare-associated any other healthcare exposure (HA-OTHER)

Any patient who has an infection or colonization **not** acquired at your facility that is thought to be associated with another healthcare exposure in Canada (e.g. another acute-care facility, long-term care, rehabilitation facility, clinic or exposure to a medical device).

Healthcare-associated acquired from any other healthcare exposure outside of Canada (HA-OTHER, OUTSIDE CANADA)

[1] *Calendar day 1 is the day of hospital admission*

Any patient who has an infection or colonization **not** acquired at your facility that is thought to be associated with another healthcare exposure **outside of Canada** (e.g. another acute-care facility, long-term care, rehabilitation facility, clinic or exposure to a medical device outside of Canada).

Community–associated (CA)

No exposure to healthcare that would have resulted in this infection or colonization (using best clinical judgement) and does not meet the criteria for a healthcare-associated infection or colonization.

Denominator Data

Denominator data will be collected on the quarterly denominator form and submitted online via the Canadian Network for Public Health Intelligence (CNPHI) at www.cnphi-rcrsp.ca.

The data collected will include:

1) total number of patient admissions per year

2) total number of inpatient-days per year

In CNPHI, denominator data are entered via the "Profiles and Denominators" page. CPO rates are calculated using the same denominator data as VRE and MRSA/MSSA, so please enter your denominator data under VRE or MRSA/MSSA.

Data Management and Reporting

Case Reporting

All patient questionnaire data (see Appendix 3 – CPO Patient Questionnaire) should be submitted online through the Canadian Network for Public Health Intelligence (CNPHI) at www.cnphi-rcrsp.ca.

Laboratory Reporting

The Appendix 2 must be included with the shipment AND emailed to the NML at **nml.arni-rain.lnm@phac-aspc.gc.ca**. It is important that when isolates are submitted to the NML that they are identified as CNISP isolates otherwise they will not be included in CNISP surveillance. The NML will send the carbapenemase testing results via email to the lead CNISP member and lead ICP for each hospital.

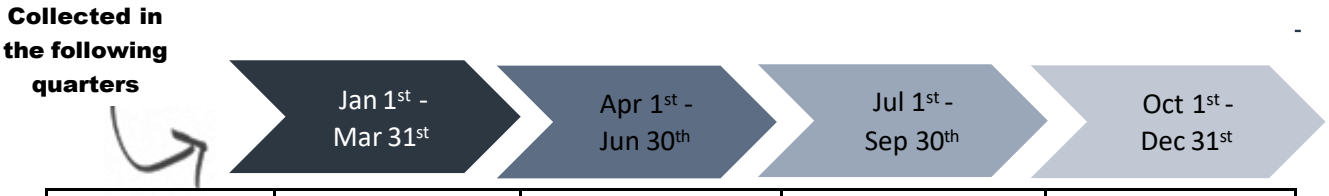
Surveillance Algorithm

The Appendix 6 has been provided to assist in surveillance activities.

Submission Timeline

Please submit CPO data and isolates according to the following timeline:

CNISP CPO Submission Timeline



Patient questionnaires	Data and isolates due by June 30th	Data and isolates due by September 30th	Data and isolates due by December 31st	Data and isolates due by March 31st of following surveillance year
Isolates				
Zero Report (if no cases)				
Denominator data				

Zero Report

For any quarter with no cases at your site, a zero report must entered in the CNPHI CPO module so that quarters with zero counts can be differentiated from missing data. If no cases are submitted and you are missing zero reports for a surveillance year, your hospital's data will not be included in the rates.

Environmental Sampling

NOTE: Environmental sampling is optional. Sites that wish to continue environmental sampling can continue to do so and notify CNISP.

If possible, please consider screening drains at discharge for CPO positive patients. Please swab all drains in the patient room and bathroom **before** a cleaning protocol is implemented. Please complete and send the APPENDIX 2 - LABORATORY SHIPPING FORM to the NML along with the CPO positive environmental isolate(s). In the laboratory shipping form, under site of isolation please select environmental (ENV) and indicate site (drain, sink, etc.). Please use the same unique PID assigned to the patient whose room was swabbed and add a suffix E1 or E2 etc. to the case number (e.g. 99ZYY001E1 and 99ZYY001E2).

Analysis

Patients with multiple CPO positive isolates will only be included in the rates once based on the isolate from the most invasive site. E.g. if the patient was initially colonized with a CPO and subsequently develops a CPO infection, within the same surveillance year, the colonization will be excluded from the rates and only the infection will be included.

Rates, descriptive epidemiology, microbiological and resistance data will be calculated annually and available on CNPHI CPO module visual analytics. Data will be reported through surveillance reports, presentations, publications, and published on the PHAC and/or AMMI website.

ETHICS

While this surveillance project does not involve any alteration in patient care and surveillance for healthcare-associated infections is a routine component of quality assurance and patient care in Canadian healthcare facilities, ethics approval may be sought at some hospital sites. A unique identifier linked to patient names will only identify patients at the local CNISP site and is not transmitted to the PHAC. All data submitted to PHAC are kept strictly confidential.

PRIVACY

Any data released by CNISP will be in summary format and will not identify individual hospitals or patients. Hospital administrators should be made aware that national reporting of aggregate data will occur.

Appendix 1 - Laboratory considerations for case eligibility for surveillance

Determining carbapenem resistance and carbapenemase production in gram-negative bacilli: determining eligibility for inclusion of cases in surveillance

All *Enterobacterales* and *Acinetobacter spp.* that meet at least **ONE** of the following criteria should be submitted to the NML:

1. Tested fully resistant to a carbapenem based on the current CLSI M100 guidelines for zone diameters and/or MIC values as listed below:

At least ONE of the following carbapenems:	***Enterobacterales:***		***Acinetobacter:***	
	MIC (*µg/ml*)	Disk diffusion (*mm*)	MIC (*µg/ml*)	Disk diffusion (*mm*)
Imipenem	≥ 4	≤ 19	≥ 8	**≤18**
Meropenem	≥ 4	≤ 19	≥ 8	≤ 14
Doripenem	≥ 4	≤ 19	≥ 8	≤ 14
Ertapenem	≥ 2	≤ 18	n/a	

2. Tested positive for a carbapenemase in laboratories that conduct molecular testing (PCR) or immunochromatographic lateral flow assay for specific enzymes (e.g. K-SeT).

   Laboratories should be aware that commercial tests may include only the most common carbapenemases (i.e. KPC, OXA-48, NDM) and may not include more rare ones (i.e. VIM, IMP, GES, NMC-A/IMI, SME, and others.

   If the molecular test is negative but a laboratory suspects the presence of a carbapenemase, the isolate should be further tested by the submitting laboratory, their Provincial Laboratory, or the NML. Isolates then confirmed to harbour a carbapenemase are eligible for inclusion in surveillance.

3. Tested positive for carbapenemase production by a phenotypic test such as the mCIM, Carba-NP or a commercial equivalent. These tests can help determine if a suspected CPO that was negative by molecular testing does in fact harbour a carbapenemase.

   Note: these tests can produce false negative results for poorly expressed enzymes (which likely have low MICs), enzymes that only slowly hydrolyze carbapenems (e.g. OXA-48 group, GES-type), or non-specificity of the test for certain enzymes (e.g. SME, NMC-A/IMI, GES-type by Beta-Carba test).

Appendix 2 - Laboratory Shipping Form

Instructions for submitting surveillance data for carbapenemase-producing organisms

1. All fields of this form should be filled out and sent to the NML (care of Dr. Golding) along with the patient specimens. Clearly label each specimen with their unique patient identifier.
2. Please also email this form to nml.arni-rain.lnm@phac-aspc.gc.ca on the day of shipping to allow tracking of the shipment.
3. Send isolates with this form to the following:

Send isolates to:
Dr. George Golding
National Microbiology Laboratory
1015 Arlington St., Winnipeg, Manitoba R3E 3R2
Tel: 204 784 8096
Fax: 204 789 5020
Use FedEx billing number: 6327-8173-3

In addition, please email the shipping form to:

nml.arni-rain.lnm@phac-aspc.gc.ca

Please click on the icon below to access the excel shipping form:

CNISP Laboratry
Shipping Form CPO_2

Appendix 3 – CPO Patient Questionnaire

Please complete the following questionnaire to contribute to surveillance for inpatients, ER and outpatients with Carbapenemase-Producing Enterobacterales (CPE) or Carbapenemase-Producing Acinetobacter (CPA)

1.	Is this a CPO colonization or infection in a patient previously identified with a CPO in another surveillance year? □ Unknown □ No □ Yes please enter the original/previous unique patient ID: _____ **YY** _____**(**e.g. 99Z23001) *(CHEC site #) (year) (case number)*
2.	Is this isolate associated with an infection or a colonization? □ Infection[2] □ Colonization
3.	CHEC Site: _____
4.	Unique Patient Identifier: _____ **YY** _____**(**e.g. 99Z24001) *(CHEC site #) (year) (case number)*
5.	Patient ward when positive specimen was collected: □ Inpatient: If inpatient please check one of the following: □ ICU □ NICU □ PICU □ Medical ward □ Surgical ward □ Other inpatient ward (*specify):*_____ □ Emergency Room (ER) If the positive specimen was collected while the patient was in ER, was this patient subsequently admitted? □ Yes □ No □ Unknown □ Outpatient □ Unknown
6.	Age _____ □ Years □ Months □ Days
7.	Sex: □ Male □ Female □ Unknown

[2] Infection is determined using the CDC/NHSN surveillance definitions and may be accessed at: http://www.cdc.gov/nhsn/PDFs/pscManual/17pscNosInfDef_current.pdf

8.	Date of admission: _____/ _____/ _____ DD MMM YYYY □ Not applicable as patient was not admitted
9.	Type of CPO isolate: □ Screening isolate □ Clinical isolate
10.	Date of positive culture: (*Specimen collection date from which the positive organism was isolated):* _____/ _____/ _____ DD MMM YYYY
11.	Organism isolated: □ Acinetobacter baumannii □ Serratia spp. □ Klebsiella pneumoniae □ Enterobacter spp. □ Escherichia coli □ Proteus spp □ Other, specify: _____ □ Citrobacter spp. □ Morganella morganii □ Enterobacter cloacae □ Klebsiella oxytoca □ Citrobacter freundii □ Serratia marcescens
12.	Site of isolation: (Please select the site of isolation for the isolate that was submitted to the NML) □ Blood □ Urine □ Wound □ Surgical site □ Skin/soft tissue □ Stool/rectal swab □ Sputum/Endotracheal secretions/Bronchoalveolar lavage □ Other, specify: _____
13a.	Where was this CPO acquired? □ Healthcare-associated – acquired in your acute-care facility (HA-YAF) □ Healthcare-associated – acquired from any other healthcare exposure in Canada (HA-Other, Canada) ➔ skip to Q14. □ Healthcare-associated – acquired from any other healthcare exposure outside of Canada (HA-Other, outside Canada) ➔ skip to Q14. □ Community-associated (CA) ➔ skip to Q14. □ Unable to determine ➔ skip to Q14.
13b.	If healthcare-associated in your facility (HA-YAF), is there evidence of any of the following modes of transmission? Please select all that apply. If unsure, please select unknown. □ N/A (not HA-YACF) □ Sink/drain □ Hemodialysis □ Outbreak/cluster associated □ Device/procedure (e.g. ERCP, endoscopy), specify: □ Another patient (e.g. contact tracing, contact with known CPO positive patient) □ Other exposure, please specify: □ Unknown

14	If this patient is a newborn (<28 days), was the mother known to be CPO positive? □ Yes □ No □ Unknown □ N/A - patient is not a newborn
15a	Is there any evidence of international travel in the 12 months prior to the patient's CPO diagnosis? □ No, there is no evidence of international travel. ➔ if NO, skip to Q16. □ Yes, specify where travelled to: _____ □ Unable to determine
15b.	If traveled internationally, is there evidence the patient received medical care where they traveled to? □ N/A - no evidence of international travel □ Yes, there is evidence that the patient sought medical care while on international travel □ No, there is no evidence that the patient sought medical care while on international travel □ Unable to determine
16.	Is there evidence the patient has pre-existing comorbidities(s)? Please check all that apply. □ No evidence of any pre-existing comorbidity □ Yes *(please check all that apply)* □ Diabetes □ Liver disease □ HIV infection □ Cancer (active) □ Lung disease (e.g., asthma, COPD) □ Kidney disease (include all patients on dialysis) □ Solid organ transplant recipient □ Bone marrow transplant recipient □ Other immunosuppression, specify _____ □ Heart disease □ Other, specify _____ □ Unknown
Q17- Q19 are only to be completed for <u>infected</u> cases	
17.	Was the patient admitted to an ICU within 30 days of positive culture? □ N/A - patient was already in an ICU at the time the positive culture was obtained □ Yes, please indicate the date of ICU admission: _____/ _____/ _____ DD MMM YYYY □ No □ Unknown

18a.	Please indicate which antibiotics[3] were received since the beginning of the infection (i.e. date of positive culture). (*Select all that apply*): [*DROP DOWN: see Appendix 4 for antibiotic list]* Date started[4]: DD/MM/YYYY Date ended: DD/MM/YYY □ Other: _____ □ No antibiotic received □ Antibiotic received, but cannot specify which one ☐ Unknown
18b.	What type of infection[5] was treated? *Select all that apply.* □ Primary bacteremia □ Bone and joint □ Central nervous system □ Cardiovascular system □ Eye, ear, nose, throat, or mouth □ Gastrointestinal system □ Lower respiratory system □ Reproductive tract □ Skin and soft tissue □ Urinary system □ Other, please specify: _____
18c.	Was the infection complicated by secondary bacteremia? □ Yes □ No □ Unknown

[3] Note: The following antibiotics do not need to be reported as they lack activity against gram negative bacteria:
Azithromycin, Clarithromycin, Clindamycin, Cloxacillin, Dalbavancin, Daptomycin, Ducloxacillin, Erythromycin, Linezolid, Metronidazole, Ocacillin, Prisinamycin, Rifampicine, Telavancin, Vancomycin iv, Vancomycin po.
Antibiotics that are indicated to be captured under "Other" in Appendix 4 will not be available in the drop down list on CNPHI
Do not report antifungals
Do not report antiparasitic drugs
Do not report antivirals
Do not report antibiotics administered for an infection other than the one reported herein
Do not report prophylactic antibiotics

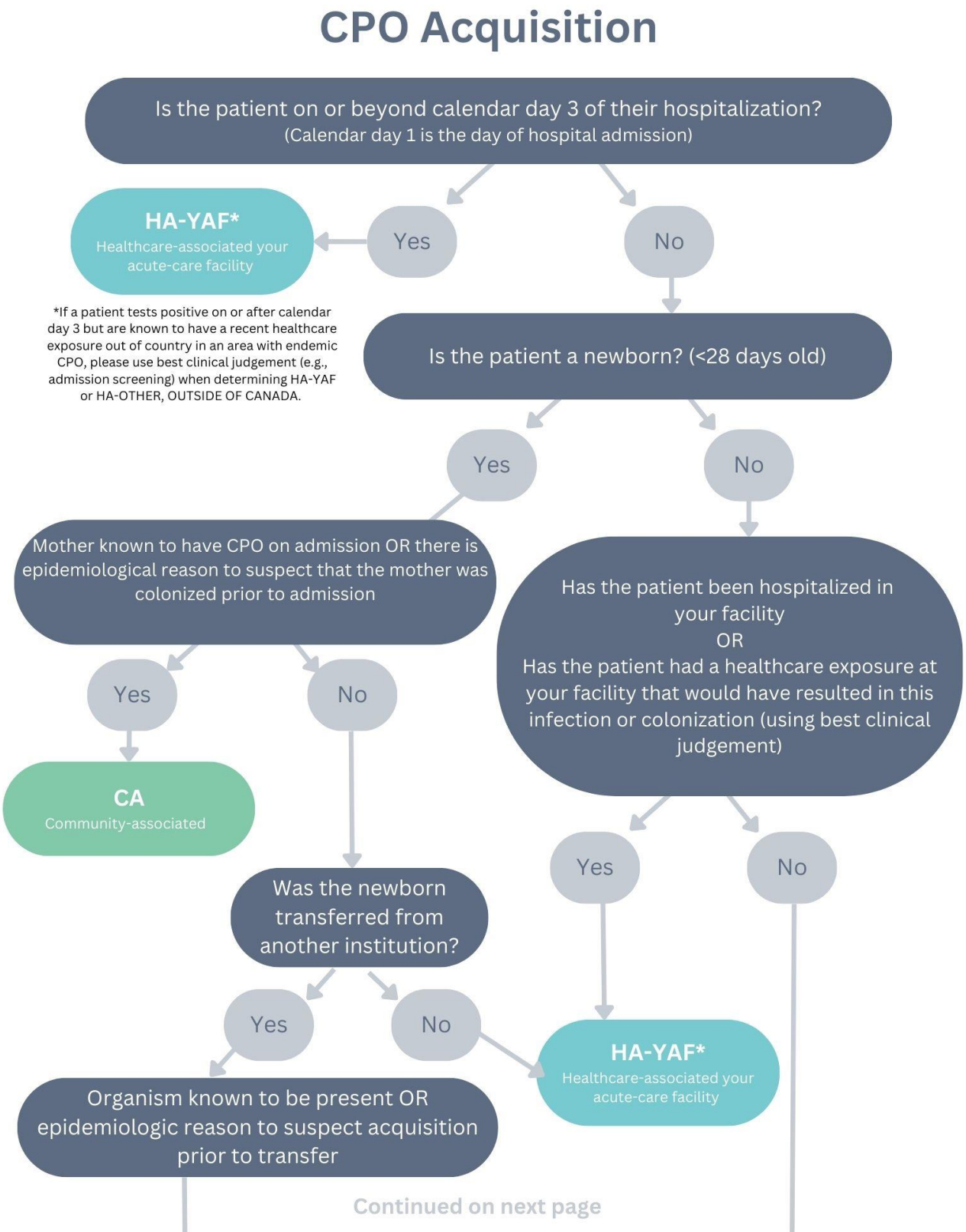
[4] Start and end dates are only applicable for antibiotics indicated in Appendix 4
[5] Using the CDC/NHSN infection definitions and may be accessed at (page 17-4):
https://www.cdc.gov/nhsn/pdfs/pscmanual/17pscnosinfdef_current.pdf

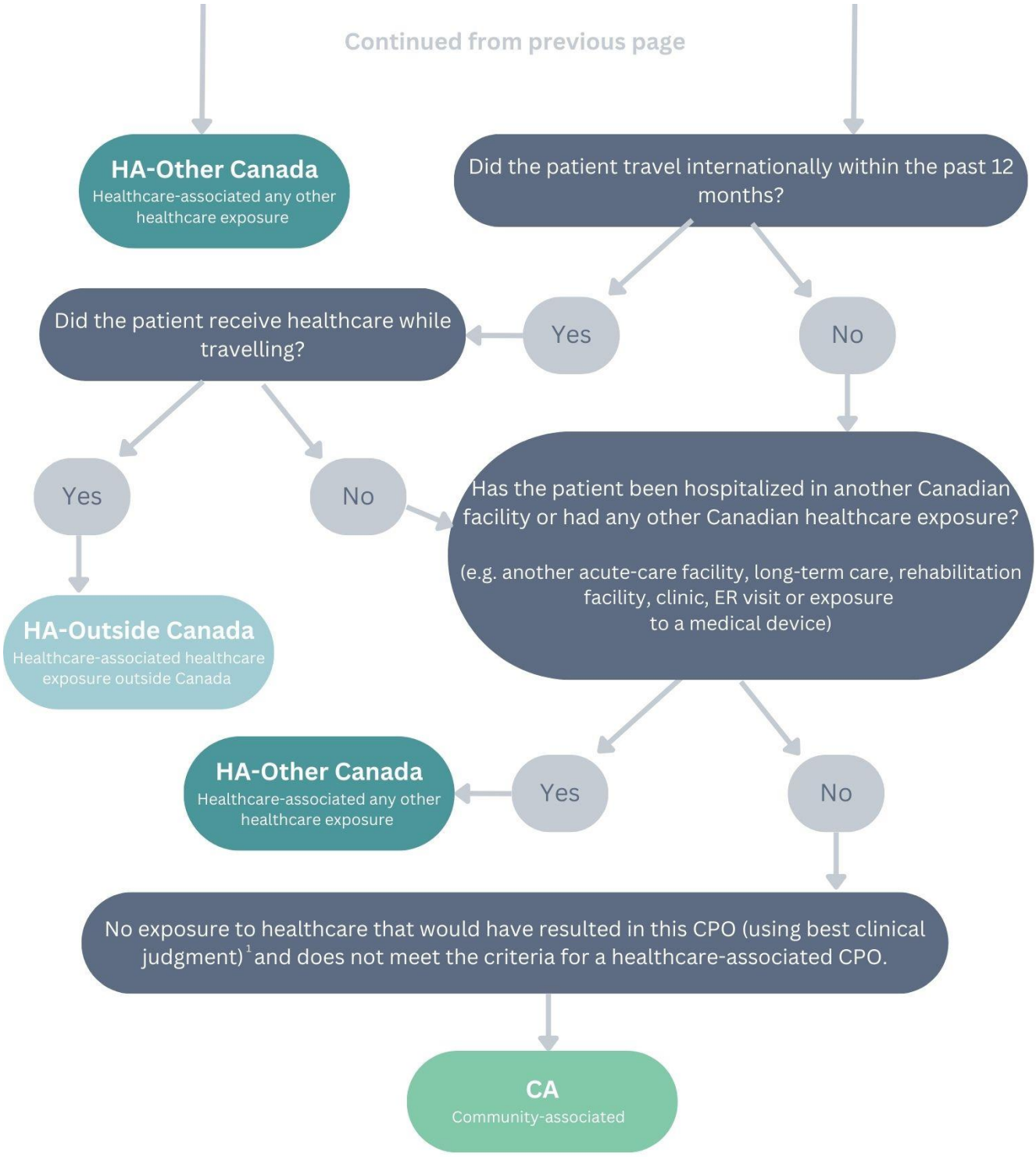
19.	What was the patient outcome 30 days after positive culture? □ Patient alive, still in hospital □ Patient survived and discharged Date of discharge _____/ _____/ _____ DD MMM YYYY □ Patient survived and transferred Date of transfer _____/ _____/ _____ DD MMM YYYY □ Patient died Date of death _____/ _____/ _____ DD MMM YYYY □ Unknown
20.	If the patient died within 30 days after the positive culture, please indicate the relationship of CPO to the death □ CPO was the cause of death □ CPO contributed to death □ Death is unrelated to CPO □ Causality between CPO and death cannot be determined

Appendix 4 – List of antibiotics

	List under other category	Provide date start/stop
Amikacin		
Amoxicillin	X	
Amoxicillin-clavulanic acid		
Ampicillin/sulbactam	X	
Ampicillin	X	
Aztreonam		
Cefaclor	X	
Cefadroxil	X	
Cefazoline	X	
Cefepime		
Cefiderocol		Y
Cefixime		
Cefotaxime		
Cefoxitin	X	
Cefprozil	X	
Ceftaroline	X	
Ceftazidime		
Ceftazidime-avibactam		Y
Ceftobiprole		
Ceftolozane-avibactam		Y
Ceftriaxone		
Cefuroxime	X	
Cephalexin	X	
Chloramphenicol		
Ciprofloxacin		
Colistin		
Doripenem	X	
Doxycycline	X	
Eravacycline		Y
Ertapenem		
Fosfomycin		
Gentamicin		
Imipinem-cilastatin		
Imipenem-relebactam		Y
Levofloxacin		
Meropenem		
Meropenem-vaborbactam		Y
Minocycline		
Moxifloxacin		
Nitrofurantoin		
Ofloxacin	X	
Omadacycline	X	
Penicillin (G or V)	X	
Piperacillin	X	
Piperacillin-tazobactam		
Polymyxin B	X	
Tetracycline		
Ticarcillin-clavulanic acid		
Tigecycline		
Tobramycin		
Trimethoprim-sulfamethoxazole		
Other antibiotic 1 [indicate name]		
Other antibiotic 2 [indicate name]		

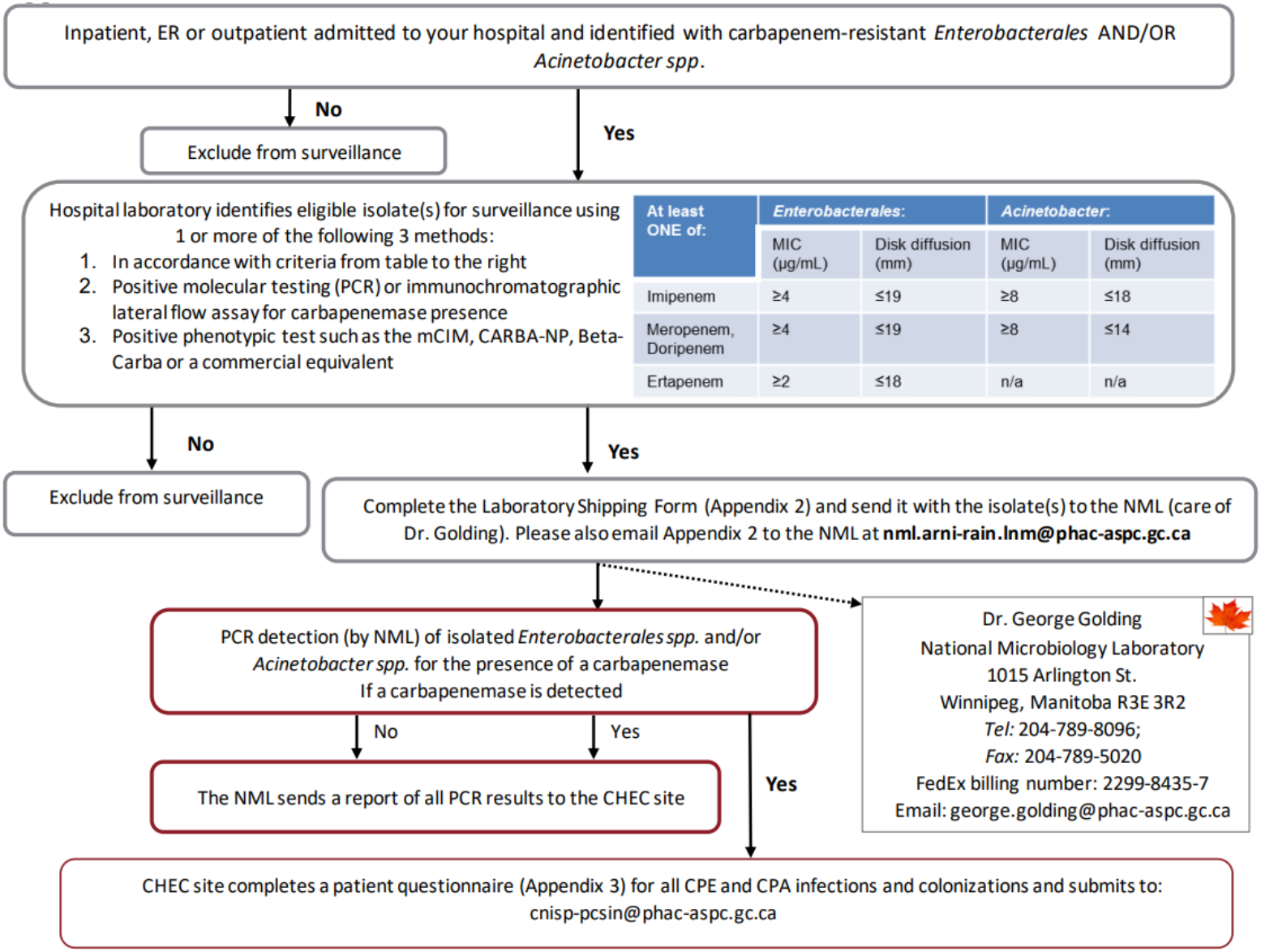
Appendix 5 – Flow chart to determine patient exposure classification



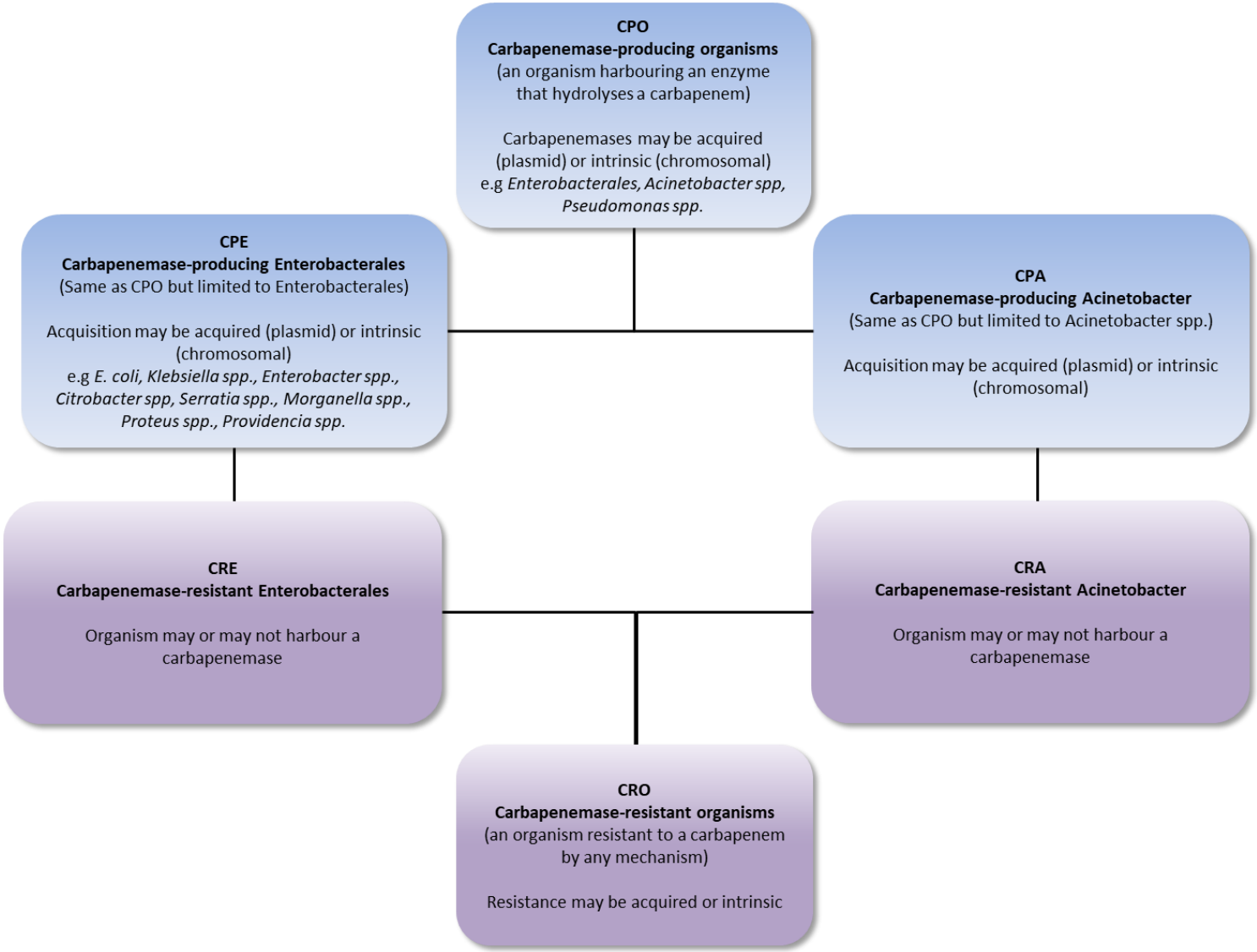


[1]Consideration should be given to the frequency and nature of exposure to a medical device and/or procedure. For example, pediatric patients with clinic visits for otitis media, asthma, well-baby etc., may or may not be considered as HA while pediatric patients with clinic visits that involved invasive procedures or day surgery may be more likely to be considered HA. Adult patients attending dialysis, receiving chemotherapy, outpatient visits involving invasive procedures or day surgery may be more likely to be considered HA compared to adult patients with occasional outpatient or community health clinic visits.

Appendix 6 - CPO Surveillance Algorithm



Appendix 7 - Key Carbapenem and Carbapenemase Acronyms



Appendix 8 - Data Dictionary

Definitions and notes for Appendix 3 – CPO Patient Questionnaire

1. Is this a CPO colonization or infection in a patient previously identified with a CPO in another surveillance year?

If known, please indicate whether this patient was identified as CPO positive in a previous surveillance year and indicate the PID so that we may link the cases.

2. Is this isolate associated with an infection or colonization?

Based on the isolate submitted, please indicate if this cases is colonized or infected. Infection is determined using the CDC/NHSN surveillance definitions and may be accessed at: http://www.cdc.gov/nhsn/PDFs/pscManual/17pscNosInfDef_current.pdf

3. CHEC Site #

This will be the **3-character** alphanumeric number assigned to your institution. It will always begin with the two digit number assigned to your CHEC member e.g., 07, 15, and a letter assigned by the CHEC member for that specific institution e.g., A, B, C, etc. The CHEC site # for each institution should always be the same for all the CHEC/CNISP surveillance projects and will always have all three alphanumeric digits reported as the CHEC site #, e.g., 07A, 15A.

4. Unique identifier code

Please assign a unique patient identifier as follows: CHEC site number, surveillance year then consecutive number (e.g., 99ZYY001). Note: When multiple isolates are submitted for the same patient in the same surveillance year, please indicate by adding a suffix A or B etc. to the case number (e.g., 99ZYY001A and 99ZYY001B).

Note: The unique patient identifier assigned to the isolate on Appendix 2 - Laboratory Shipping Form should correspond to the unique patient identifier on the Appendix 3 – CPO Patient Questionnaire

5. Patient ward

Please indicate the ward the patient was on when the positive specimen was collected (e.g., medical, surgical, ICU). If the positive specimen was collected while the patient was in ER, please indicate if this patient was subsequently admitted to hospital.

6. Age

Please enter the patient's age (in years, months or days) at the time of positive culture.

7. Sex

Check male, female or unknown as appropriate.

8. Date of admission

Please indicate the date when the patient was admitted to the hospital using the following format Day (##), Month (May) and Year (2024).

9. Type of CPO isolate

Please indicate whether the isolate was obtained as a result of screening or a clinical isolate (blood, wound, surgical site, respiratory etc.).

10. Date of positive culture

Please indicate when the isolate that tested CPO positive was collected.

11. Organism isolated

Please select the organism isolated as reported by the laboratory.

12. Site of isolation

Please indicate the site of isolation for the isolate that was submitted to the NML.

13. Exposure classification

a. Where was this CPO acquired?

Please indicate whether the infection or colonization was acquired in a healthcare setting (HA) or in the community (CA) according to the following definitions and in accordance with the best clinical judgement of the healthcare and/or infection prevention and control practitioner (IPC). If the site of acquisition cannot be determined, please report as 'unable to determine'.

Healthcare-associated acquired in your acute-care facility (HA-YAF)

- Patient is on or beyond calendar day 3[1] of their hospitalization

OR

- Has had a healthcare exposure at your facility that would have resulted in this infection or colonization (using best clinical judgement)

Healthcare-associated – acquired from any other healthcare exposure in Canada

Any patient who has an infection or colonization <u>not</u> acquired at your facility that is thought to be associated with another healthcare exposure in Canada (e.g. another acute-care facility, long-term care, rehabilitation facility, clinic or exposure to a medical device).

[1] Calendar day 1 is the day of hospital admission

Healthcare-associated – acquired from any other healthcare exposure outside of Canada

Any patient who has an infection or colonization not acquired at your facility that is thought to be associated with another healthcare exposure outside of Canada (e.g. another acute-care facility, long-term care, rehabilitation facility, clinic or exposure to a medical device).

Community-associated (CA):

No exposure to healthcare that would have resulted in this infection or colonization (using best clinical judgement) and does not meet the criteria for healthcare-associated infection or colonization.

b. If healthcare-associated in your facility (HA-YAF), is there evidence of any of the following modes of transmission?

Please indicate whether there is any evidence to suggest that this patient became infected/colonized with this CPO through any of the modes listed (i.e. are any of the modes of transmission suspected as potential sources of exposure?). Please use best clinical judgement when determining the mode of transmission.

14. If this patient is a newborn (<28 days), was the mother known to be CPO positive?

If this patient is a newborn, please indicate whether the mother was known to be CPO positive to help inform the exposure classification of the infant.

15. Patient international travel

a. Is there any evidence of international travel in the 12 months prior to the patient's CPO diagnosis?

Please indicate if the patient has travelled outside of Canada in the 12 months prior to the date of positive culture.

b. If travelled internationally, is there evidence that the patient received medical care where they travelled to?

If answered 'yes' to question 15a, please indicate (if possible) whether the patient received medical care while travelling outside of Canada.

16. Does the patient have any pre-existing comorbidities?

Please indicate whether the patient has any pre-existing comorbidities. Please select all that apply.

Note: Q17-Q19 are only to be completed for infected cases

17. Was the patient admitted to an ICU within 30 days of positive culture?

Please indicate whether the patient was admitted to an ICU within 30 days of positive culture.

18a. Did the patient receive antibiotics and what was the treatment duration?

Please use the list (Appendix 4) and indicate which antibiotics (if known) the patient received, what date the antibiotic(s) were started and what date they ended.

18b. What type of infection was treated?

Please specify the type of infection that was treated in question 18a. Types of infection is determined using the CDC/NHSN surveillance definitions and may be accessed at: https://www.cdc.gov/nhsn/pdfs/pscmanual/17pscnosinfdef_current.pdf (17-4)

18c. Was the infection complicated by secondary bacteremia?

Please indicate if the infection was complicated by secondary bacteremia or not.

19.Relationship of CPO to death

If the patient died, please indicate if CPO was the cause of death (i.e. the patient had not other condition that would have caused death during the admission); CPO contributed to death (i.e. CPO exacerbated an existing condition that led to the patient's death), CPO was unrelated to death or unable to determine the causality between CPO and death. Please consult with the most responsible physician (MPR) and/or the CNISP member to conduct an assessment to determine the relationship of CPO to death.

Appendix 9 – Revision History

Date	Revisions Made
June 3, 2014	Added response 'unable to determine' to Q8 ''Where CPO acquired?' – now Final v2
June 9, 2014	Corrected numbering of questions – now Final v3
July 15, 2014	Added ER visits to denominator data collection – was already added to separate 'quarterly denominator form' – now Final v4
October 30, 2014	Began making changes to homogenize CNISP protocol formatting
December 15, 2014	Updated the unique patient ID for multiple organisms and/or re-admission to reflect previous nomenclature (i.e. adding suffix A or B).
December 30, 2014	1. Updated Q8 to include 'other Canadian healthcare facility' and 'other healthcare facility outside of Canada' 2. Changed wording of Q13 to clarify evidence of transmission.
2015	Question Q13 "Is there any evidence that this was a nosocomial-acquired case?" was removed in the 2015 protocol.
October 28, 2015	Question 15c related to what medical procedure patients were subjected to if they received medical care abroad has been removed.
November 2017	1. Added Q13b regarding possible sources/modes of transmission 2. Added Q19 - for patients with more than one CPE or CPA infection or colonization in a calendar year, please report the PID of the previous case 3. Project name updated to CPO surveillance. Note: reflected in PID format 4. Update to PID format: For multiple pathogens, infections, colonizations etc. within same the admission use the same PID with suffix A, B, C etc. **NEW** – use a new PID for a new admission
July 2018	1. Discontinued CPO surveillance of ER and outpatients 2. Updated Appendix 1 to reflect sites that conduct their own molecular testing 3. Removed surveillance year as protocol will no longer be updated annually 4. Added inclusion and exclusion surveillance criteria 5. Removed Q1 from pt questionnaire (Appendix 3) and added a question regarding who/where carbapenemase confirmation is conducted. 6. Updated definitions for healthcare and community associated
Nov 2018	1. Added section on environmental sampling and updated Appendix 2 accordingly 2. Added Q18 – Added question - were any sinks or drains tested for CPO related to this patient 3. Added Q14c – Added question regarding evidence of international travel by a member of the household or caregiver

January 2020	1. ER and outpatients were added back into surveillance 2. Hemodialysis added as a response option to Q13b 3. Question on environmental isolates was moved to Appendix 2 Laboratory Shipping Form 4. Updated Appendix 5 Key Carbapenem and Carbapanemase Acronyms 5. Under Case Identification and Isolate Submission, provided additional details regarding inclusion criteria for patients with multiple samples collected
January 2021	Added new COVID-19 question to patient questionnaire (Q.17)
January 2022	1. Updated the working group member list and email addresses for CNISP and NML 2. Data entry for CPO patient questionnaire available on CNPHI Web Data for 2022 cases
January 2023	1. Updated the working group member list 2. Added question for patients whose positive culture was collected in ER – was this patient subsequently admitted? 3. Added attributable mortality to the pt questionnaire
November 2023	1. Updated the working group member list 2. Updated reporting section for CNPHI module 3. Removed question regarding which laboratory conducted the testing 4. Removed question regarding exposure to a caregiver that traveled in the past 12 months 5. Removed question regarding testing positive for COVID-19 6. Added a question about CPO status of the mother of a newborn case 7. Added outbreak/cluster associated as an option for exposure options 8. Expanded the table on how to handle multiple isolates
December 2024	1. Updated the working group member list 2. Added flow charts on how to handle multiple isolates and determine source of acquisition 3. Added a question regarding antibiotic treatment for CPO infections 4. Added a question regarding what type of infection the antibiotics were used to treat 5. Added a question on whether the infection was complicated by secondary bacteremia