Public Health Ontario
PARTNERS FOR HEALTH

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Laboratory Recommendations for the Identification of CRE

Screening for colonization with carbapenem-resistant *Enterobacteriaceae* (CRE)

The purpose of this document is to provide laboratories guidance on how to process specimens taken to identify colonization of patients with carbapenem-resistant *Enterobacteriaceae* (CRE).

Recently, CRE have been reported worldwide as a consequence of the acquisition of carbapenemase genes. The first carbapenemase-producing *Enterobacteriaceae* (NmcA) was identified in 1993. Since then, a large variety of carbapenemases have been identified in *Enterobacteriaceae* belonging to three classes of β-lactamases, including *Klebsiella pneumoniae* carbapenemases (KPC), New Delhi metallo-β-lactamase-1 (NDM-1) and OXA-48.

PIDAC guidelines ("Annex A: Screening, Testing and Surveillance for Antibiotic-Resistant Organisms [AROs] in all health care settings," available from http://www.oahpp.ca/resources/pidac-knowledge/best-practice-manuals/screening-testing-and-surveillance-for-antibiotic-resistant-organisms-aros.html) recommend screening patients at risk for colonization with CRE.

The Quality Management Program – Laboratory Services (QMP-LS) has also released recommendations regarding how to identify CRE from clinical isolates (Quality Management Program-Laboratory Services. Bacteriology Consensus Practice Recommendations - Antimicrobial Susceptibility Reporting [database on the Internet]. Toronto (ON): QMP-LS QView. c2011 [cited 2011 Dec 07]).

SCREENING SPECIMENS

- Rectal swabs are recommended for screening patients for CRE carriage. Stool specimens are also acceptable but may be more difficult to obtain.
- Urine specimens may be considered in addition to rectal swabs for screening in patients with indwelling catheters and/or those who have had CRE isolated from urine specimens in the past.

- During outbreaks, the outbreak management team may consider requesting other specimens (e.g., sputum in intensive care unit patients, in whom CRE have caused pneumonia) for screening.

PROCESSING SPECIMENS IN THE LABORATORY

- Currently, no carbapenem-containing selective medium reliably detects all of the different types of CRE.

- To detect CRE in screening specimens (e.g., admission swabs of high-risk patients), we recommend plating specimens on selective media currently available for the detection of ESBL-producing *Enterobacteriacae* as a surrogate marker of potential CRE detection. ESBL chromogenic agars should be avoided since most contain inhibitors of AmpC, which may inhibit those CRE that also contain AmpC genes**.**

Carbapenem susceptibility testing should then be performed on the *Enterobacteriacae* growing on the ESBL screening plate to determine if further testing for CRE is warranted. The most effective screening method at present is to perform meropenem disc diffusion testing on Mueller-Hinton agar on such isolates; further work-up is only necessary on isolates that have zones $\leq$ 25mm (EUCAST epidemiologic cut-off for *E. coli*) (Quality Management Program-Laboratory Services. Bacteriology Consensus Practice Recommendations - Antimicrobial Susceptibility Reporting [database on the Internet]. Toronto (ON): QMP-LS QView. c2011 [cited 2011 Dec 07]).

- Isolates that are meropenem-screen positive should be tested using the same algorithms the laboratory uses for identifying CRE in clinical isolates, using a phenotypic inhibitor method (e.g., Rosco diagnostic tablets KCP+MBL Confirm kit Pro-Lab) and/or molecular testing to detect of CRE. Isolates should be forwarded to the Public Health Ontario (PHO) Laboratory as appropriate.

- During outbreaks, the optimal methodology for screening for CRE colonization may differ depending on the particular CRE involved in the outbreak. Laboratories and outbreak management teams are encouraged to consult with the PHO Laboratory and other reference laboratories to identify the medium and screening method that will be most effective for the individual outbreak; sensitivity, laboratory workload and timeliness of results availability are all important considerations.

Note: These recommendations are based on currently available data and may change when new data become available.