ANTIBIOTIC RESISTANT ORGANISMS SURVEILLANCE PROTOCOL FOR ONTARIO HOSPITALS

Developed by the Ontario Hospital Association and the
Ontario Medical Association
Joint Communicable Diseases Surveillance Protocols Committee

Approved by:
The OHA and the OMA Board of Directors
The Ministry of Health and Long-Term Care –
The Minister of Health and Long-Term Care

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This protocol was developed jointly by the Ontario Hospital Association and the Ontario Medical Association to meet the requirements of the *Public Hospitals Act 1990,* Revised Statutes of Ontario, Regulation 965. This regulation requires each hospital to have by-laws that establish and provide for the operation of a health surveillance program including a communicable disease surveillance program in respect of all persons carrying on activities in the hospital. The communicable disease program is to include the tests and examinations set out in any applicable communicable disease surveillance protocol. The regulation states that the communicable disease surveillance protocols that hospitals must adopt are those "published jointly by the Ontario Hospital Association (OHA) and the Ontario Medical Association (OMA) and approved by the Minister (of Health and Long-Term Care)."

This Protocol has been reviewed since the previous version; changes have been highlighted in yellow for easy identification. Protocols are reviewed on a regular basis, every two years or as required.

The protocol reflects clinical knowledge, current data and experience, and a desire to ensure maximum cost effectiveness of programs, while protecting health care workers and patients. It is intended as a minimum standard that is practical to apply in most Ontario hospital settings. It does not preclude hospitals from adopting additional strategies that may be indicated by local conditions.

Members of the Joint OHA/OMA Communicable Disease Surveillance Protocols Committee

Representing the Ontario Hospital Association

Dr. Kathryn Suh (Co-chair)
Medical Director, Infection Prevention and Control Program
The Ottawa Hospital, Ottawa

Sandra Callery, RN MHSc CIC
Director, Infection Prevention and Control

Kathleen Poole, MScN, COHN(C) CIC
Infection Control Practitioner,
Providence Care, Kingston

Ontario Hospital Association

Amanda Martens
Policy Advisor
Legal, Policy and Professional Issues

Representing the Ontario Medical Association

Dr. Maureen Cividino (Co-chair)
IPAC Physician, Public Health Ontario
Occupational Health Physician
St. Joseph's Healthcare, Hamilton

Dr. Irene Armstrong
Associate Medical Officer of Health
Communicable Disease Control
Toronto Public Health, Toronto

Ontario Medical Association

Katherine Patterson
Senior Advisor
Health Policy and Promotion

Representing the Ministry of Health and Long-Term Care

Melissa Helferty, MIPH
Manager, Infectious Disease Policy & Programs
Health Protection and Surveillance Policy and Programs Branch
Office of the Chief Medical Officer of Health, Public Health

EX-OFFICIO

Dr. Nikhil Rajaram
Senior Medical Consultant, Occupational Medicine Unit
Occupational Health and Safety Branch
Ministry of Labour

Henrietta Van hulle, BN, MHSM, COHN(c), CRSP, CDMP
Vice President, Client Outreach
Public Services Health and Safety Association

Rationale for
Antibiotic Resistant Organisms (ARO) Protocol

Bacterial resistance to antibiotics has been described since their introduction in the 1940s. Some bacteria have inherent or natural resistance to certain antibiotics (e.g., *Pseudomonas aeruginosa*), while others acquire resistance to antibiotics from new pieces of genetic information. Acquired resistance is the type of resistance that is of concern because these bacteria can continue to change and develop further resistance. Heavy use of antibiotics, both in medicine and in agriculture, is a factor in the emergence of resistance. The more exposure bacteria have to antibiotics, the more selective pressure there is for them to develop resistance. In recent years, many health care facilities have seen a dramatic increase in the numbers of AROs.[1]

In health care settings, AROs can be transmitted by person-to-person contact or by indirect contact when surfaces and items in the healthcare environment become contaminated. As a result of such contact, health care workers (HCWs) and/or patients may become colonized or infected with AROs, and be a potential source for spread to others. In the hospital setting, there is a higher risk that AROs will be passed on to others if proper infection control procedures are not followed. The procedures and medications, including antibiotics, used to treat patients predispose them to colonization and infection by organisms such as AROs. People who have recently been patients in a hospital or other health care facility are more likely to be colonized or infected, and if unrecognized, can spread the organism when admitted to another institution.

Resistant organisms will continue to emerge; examples of organisms that are currently of importance are methicillin-resistant *Staphylococcus aureus* (MRSA), vancomycin-resistant enterococci (VRE), and extended spectrum beta-lactamases producing enterobacteriaceae (ESBLs), carbapenamase-producing *Enterobacteriaceae* (CPE), and *Candida auris (C. auris).*

Healthcare associated AROs are generally <u>not</u> more virulent or more transmissible than antibiotic susceptible strains. Generally, they are not a threat to healthy people, but people who require treatment in healthcare settings are at risk of exposure. These strains are often resistant to multiple antibiotics; treatment options for those who do develop infections may be limited, more toxic, and/or more expensive than treatment for susceptible strains. However, strains of MRSA that are community associated (CA-MRSA) and contain virulence factors that allow them to cause serious illness in otherwise healthy people have emerged.[2-4] These more virulent CA-MRSA strains are genetically different than healthcare associated MRSA.

Because of the limited number of effective antibiotics for the treatment of CPE, the mortality rate of patients with CPE infections has been reported to be as high as 50%.[5-7] Since 2018, CPE have been designated a disease of public health significance and are reportable to the local Medical Officer of Health.

Candida auris is an emerging fungal pathogen capable of causing invasive disease, particularly in critically ill patient populations.[8]

HCWs who are identified as carriers of AROs, such as MRSA, may have acquired the organism from occupational exposure and are not usually implicated as the "source" of an outbreak. They generally come to the attention of the Occupational Health Service (OHS) through infection control investigations of clusters or outbreaks of colonized or infected patients.

Colonization of individuals, including HCWs, may be either transient or persistent. Colonized HCWs may serve as a reservoir for ongoing transmission. Screening of HCWs to identify carriers may be important in the investigation of ongoing transmission of AROs and in prevention of further transmission. For this reason, it is essential that HCWs comply with policies and procedures related to control of AROs, including decolonization therapy if indicated.

HCWs, including immunocompromised HCWs, can avoid acquiring MRSA and other AROs by consistently following Routine Practices, including hand hygiene.

This Protocol addresses the occupational health issues associated with the prevention of transmission of AROs, screening of HCWs for specific AROs when epidemiologically indicated, and treatment of colonized staff if applicable.

This protocol does not cover *Clostridioides* (*Clostridium) difficile* infection, or organisms that are spread by the airborne route. For information on antibiotic resistant *Mycobacterium tuberculosis,* please refer to the OHA/OMA Tuberculosis Surveillance Protocol.[9]

It is essential that, in addition, hospitals have infection prevention and control policies and procedures in place to prevent the spread of AROs, as outlined in the Provincial Infectious Diseases Advisory Committee's "Routine Practices and Additional Precautions in All Health Care Settings" [10] and "Annex A: Screening, Testing and Surveillance for Antibiotic Resistant Organisms in All Health Care Settings".[11]

This protocol is only one component of an infection prevention and control program; HCWs must consistently adhere to Routine Practices.

Antibiotic Resistant Organisms Surveillance Protocol for Ontario Hospitals

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I. Purpose

The purpose of this protocol is to provide direction to hospitals to prevent the transmission of antibiotic resistant organisms (AROs) among health care workers (HCWs) and patients, specifically with regard to interrupting transmission of AROs by colonized or infected persons who are carrying on activity in the hospital. This protocol provides the minimum standard required under the Ontario Public Hospitals Act, Regulation 965.

This protocol deals with organisms that are spread by contact (see Appendix). It does not apply to organisms spread primarily by an airborne route.

II. Applicability

This protocol applies to **all persons carrying on activities in the hospital**, including but not limited to employees, physicians, nurses, contract workers, students, post-graduate medical trainees, researchers and volunteers. The term health care worker (HCW) is used in this protocol to describe these individuals. This protocol does not apply to patients or residents of the facility or to visitors.

When training students or hiring contract workers, the hospital must inform the school/supplying agency that the school/agency is responsible for ensuring that their students/contractors are managed according to this protocol.

This protocol is for use by the Occupational Health Service (OHS) in hospitals. It is expected that OHS collaborate with Infection Prevention and Control (IPAC) and other departments, as appropriate.

III. Pre-placement

No routine screening of HCWs for AROs is required. HCWs must be informed of the ongoing requirement to notify the OHS if they have been identified as being colonized or infected with an ARO in any other setting, such as another health care facility.

Reassignment of HCWs who are immunocompromised for any reason is not required; consistent use of Routine Practices, including hand hygiene, will prevent acquisition of AROs.

IV. Continuing Surveillance

No routine ongoing screening of HCWs is required for AROs. HCWs should be instructed to report skin conditions of their hands (e.g., dermatitis, open lesions) to the OHS for assessment.

HCWs who are epidemiologically linked to transmission of an ARO may require screening (See Appendix).

In some outbreak situations where there is ongoing transmission in spite of the use of Additional Precautions, HCWs may be screened.

V. Exposure

When a patient is identified as colonized or infected with an ARO, the IPAC service of the hospital will institute precautions appropriate to the specific organism, as specified for that ARO by the facility's policy.

HCWs will be expected to comply with the hospital's policies for the ARO, including:

- Routine Practices and Additional Precautions
- hand hygiene

If an HCW is epidemiologically linked to transmission of an ARO, he/she will also be expected to comply with:

- HCW screening policies, if indicated:
  - collection of specimens appropriate for the identification of the ARO e.g., nasal, rectal, any open lesion(s);

- treatment protocols to eradicate the ARO, if required (effective decolonization protocols are currently limited to MRSA)[12]

- work restrictions, if required, pending eradication of colonization;

- post-treatment follow-up (including swabs) to ensure eradication of ARO, as required; and

- the obligation to inform other health care facilities or agencies in which they work if they have been identified as being colonized or infected with an ARO.

Work Restrictions:
The need for work restrictions or removal from patient care duties while on eradication treatment should be decided according to hospital IPAC policy on a case-by-case basis, dependent on any or all of the following:

- evidence of ongoing transmission of the organism;
- evidence that the HCW is linked to ongoing transmission;
- whether the strain isolated from the HCW is the same genotype as the outbreak strain;
- potential consequences of the ARO in high risk populations (e.g., ICU, burn unit, surgical services, implantable devices);
- effectiveness of decolonization therapy;
- compliance with treatment and IPAC precautions;
- presence of respiratory tract infection or poorly controlled allergic rhinitis that would facilitate dissemination through coughing and sneezing (for MRSA); and
- severity of any infections caused by the ARO.

If the HCW remains at work, he/she must consistently practice meticulous hand hygiene.

Non-compliance with or medical contraindication to the above may result in additional work restrictions or modifications.

See Appendix for details regarding specific organisms.

VI. Acute Disease

AROs are generally not more likely to cause disease in healthy individuals than antibiotic susceptible organisms; the concern is in interrupting transmission of AROs as treatment options are limited. HCWs are generally identified as asymptomatic carriers of AROs, which they may have acquired during the course of their activities in the hospital.

If acute illness develops, the HCW should report to OHS. Infected HCWs and their personal physicians are responsible for follow-up care and treatment. They should be managed by OHS according to current medical management recommendations and hospital OHS/IPAC policy specific to the ARO.

VII. Reporting

Although most AROs are not reportable, CPE have been designated a disease of public health significance and are reportable to the local Medical Officer of Health. (as per Ontario Regulation 135/18 and amendments under the Health Protection and Promotion Act).

In accordance with the Occupational Health and Safety Act and its regulations, an employer must provide written notice within 4 days of being advised that a worker has an occupational illness, including an occupationally-acquired infection, and/or a Workplace Safety and Insurance Board (WSIB) claim has been filed by or on behalf of the worker with respect to an occupational illness, including an occupational infection, to the:

- Ministry of Labour,
- Joint Health and Safety Committee (or health and safety representative), and
- trade union, if any.

Occupationally-acquired infections and illnesses are reportable to the WSIB.

APPENDIX

1. Definitions

Carbapenemase-producing *Enterobacteriaceae* (CPE) are *Enterobacteriaceae* that are resistant to carbapenem antimicrobials (e.g. imipenem, meropenem, ertapenem) through production of carbapenemase enzymes that hydrolyse carbapenems.

Colonization is the presence of an organism in an individual in the absence of signs or symptoms of infection caused by the organism.

Direct Patient Contact involves skin-to-skin contact of the type that occurs in patient care activities that require direct, personal "hands-on" care. Transmission by direct contact is important in the spread of AROs.

Extended-spectrum beta-lactamases (ESBL) are enzymes that may be produced by some strains of *Enterobacteriaceae* that hydrolyse all cephalosporins, including third-generation cephalosporins such as cefotaxime, ceftriaxone and ceftazidime, as well as the monobactam aztreonam.

Indirect Contact involves contact with inanimate objects in the patient's environment. Transmission by indirect contact is also important in the spread of AROs.

Infection is presence of the organism with signs and/or symptoms of disease caused by the organism.

Methicillin-resistant *Staphylococcus aureus* (MRSA) is *S. aureus* resistant to all the beta-lactam classes of antibiotics (e.g. penicillins, penicillinase resistant penicillins and cephalosporins).

Vancomycin-resistant enterococcus (VRE) is defined as *Enterococcus faecalis* or *E. faecium* with acquired resistance to vancomycin. This does not include those species of enterococci that are naturally resistant to vancomycin (e.g., *E. gallinarum, E. casseliflavus*).

CPE Confirmed Case Definition[13]

Laboratory confirmation of CPE by an Ontario microbiology laboratory.
Both colonization detected from active screening and clinical infections are considered confirmed cases of CPE. All confirmed cases of CPE require investigation to determine if nosocomial transmission of CPE has occurred, and to identify the source of transmission.
Note: The first positive isolate from any individual identified as colonized or

infected with CPE is reportable. Subsequent positive isolates from the same patient are reportable only if the patient tests positive for a different CPE (i.e., different carbapenemase).

Candida auris is an emerging fungal pathogen. It is often resistant to fluconazole and is commonly resistant to multiple classes of antifungal drugs. C.*auris* is tolerant to many commonly used disinfectants (e.g., quaternary ammonia-based disinfectants). C.a*uris* is challenging to identify in the laboratory using common commercial yeast identification systems. It is recommended that for any suspect cases, appropriate specimens be sent to a provincial laboratory for further identification and confirmation.[8]

2. Screening Procedures for HCWs

HCWs who are epidemiologically linked to transmission of AROs (e.g. during outbreaks) may require screening.

a) Methicillin Resistant *Staphylococcus aureus* (MRSA):

HCWs having direct contact with a patient with MRSA without the use of additional precautions may be screened in accordance with hospital IPAC policy. If infection control investigations indicate that the HCW may be associated with nosocomial transmission, the HCW will be screened.

Consult with the facility's IPAC program to determine required sampling sites, which may include:

- both anterior nares (one swab); and
- any open lesions or areas of dermatitis; and
- rectal or perineal or groin swabs (employees may prefer the option of doing their own rectal/perineal swab).

b) VRE, ESBL and CPE:

HCWs who are carriers of VRE, ESBL or CPE have rarely been associated with transmission. Screening of HCWs having direct patient contact is not generally required or recommended. If IPAC investigations indicate an association with ongoing nosocomial transmission, implicated HCWs may be screened and swabs should be taken from:

- the rectum; and
- any open lesions or areas of dermatitis.

3. Decolonization Protocol for Colonized HCWs

a) MRSA

Decolonization of HCWs is, generally, only indicated if the strain isolated from the HCW is the same genotype as the strain isolated from the patients, and the HCW is epidemiologically linked to ongoing transmission.[14,15]

The optimal treatment regimen for eradication of MRSA in colonized HCWs has not been established. Various regimens are reported. One treatment regimen is as follows:[12]

- 4% chlorhexidine bath daily (avoid contact with eyes and ears); plus
- 2% mupirocin cream or ointment to anterior nares 3 times/ day; plus
- trimethoprim/sulfamethoxazole one DS tab orally twice daily, or doxycycline 100 mg orally twice daily; plus
- rifampin 300 mg orally twice daily

all for a total of 7 days.

Vancomycin is not recommended for decolonization.

Open lesions or dermatitis, if present, will require treatment and resolution of symptoms for decolonization to be successful.

One week after treatment is completed, swab anterior nares and any other previously positive sites; repeat swabs weekly for 2 more weeks (unless positive). A HCW is considered clear after 3 consecutive negative sets of swabs. If swabs remain positive after the above treatment, consult with an infectious diseases physician.

Note:

- the choice of trimethoprim/sulfamethoxazole or doxycycline in the above regimen is dependent on the sensitivity pattern of the MRSA.
- if mupirocin is medically contraindicated or organism is resistant to mupirocin, substitute bacitracin ointment for mupirocin.
- rifampin will cause urine to become red coloured; soft contact lenses may become stained and should not be worn while taking rifampin.
- rifampin should not be used as a single oral agent.
- rifampin may interfere with oral contraceptives; alternate or additional contraceptive measures should be taken for that menstrual cycle.

b) VRE, ESBL or CPE:

HCWs colonized with VRE, ESBL or CPE have rarely been associated with transmission; screening for and treatment of these AROs in HCWs is not usually

required. Currently, there is no established treatment regimen for HCWs colonized with these AROs.

If an HCW is implicated in transmission and found to be colonized, work practices should be reviewed, with particular reference to hand hygiene. If dermatitis or other skin condition is present, it should be treated.

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