**APPENDIX**

**Definitions of healthcare-associated AROs**

**MRSA/VRE/ESBL acquisition**

**Healthcare-associated:**

MRSA was first identified more than 48 hours after hospital admission, OR the patient had been hospitalized or in a long-term care facility in the previous 12 months, OR had surgery or dialysis in the previous 12 months, OR had an indwelling catheter or other medical device (eg. urinary catheter, IV line, tracheostomy, feeding tube, etc.), OR had another significant healthcare exposure (eg. dialysis, outpatient surgery, outpatient chemotherapy, home care, etc.).

Best judgment (based on epidemiology and molecular typing, if available) should be used to determine whether the MRSA/VRE/ESBL was acquired in the same hospital or in another healthcare facility.

**Community-associated:**

Patient has no prior history of MRSA/VRE/ESBL, and MRSA/VRE/ESBL was identified less than or equal to 48 hours after hospital admission, AND the patient did not stay overnight in a hospital or in a long-term care facility in the previous 12 months AND did not have surgery or renal dialysis in the previous 12 months, AND has no indwelling catheter or other medical device (eg. urinary catheter, IV catheter, tracheostomy, feeding tube, etc.).

***C. difficile* acquisition**

**Healthcare-associated (same facility):**

Onset of patient’s symptoms is 72 or more hours after admission to the hospital, OR the patient had been hospitalized in the hospital, and last discharged less than 8 weeks prior to the date the *C. difficile* toxin was first positive.

**Healthcare-associated (another facility):**

Onset of patient’s symptoms is less 72 hours after admission to the hospital AND the patient was hospitalized in and discharged from another hospital or long-term care facility less than 8 weeks before the date of admission to the same facility.

**Community-associated:**

Onset of patient’s symptoms is less than 72 hours after admission to the hospital AND patient had not been hospitalized or in a long-term care facility in the past 8 weeks.

**Appendix Table 1. Carriage sites in patients infected by MRSA, VRE, and ESBL in 2016 survey, n (%)**

|  |  |  |  |
| --- | --- | --- | --- |
| **Carriage site** | **MRSA** **(n = 236)** | **VRE** **(n = 21)** | **ESBL** **(n =117 )** |
| Skin/soft tissue | 102 (43.4)a | 4 (17.4) | 7 (6.0) |
| Bloodstream infection, endocarditis | 58 (24.6)b | 3 (13.0) | 33 (28.2)e |
| Pneumonia | 37 (15.9)c | - | 8 (6.8) |
| Surgical site | 20 (8.6) | 4 (17.4) | 6 (5.1) |
| Urinary tract | 16 (6.9) | 9 (39.1)d | 71 (60.7)f |
| Osteomyelitis  | 11 (4.7) | - | - |
| Septic arthritis | 5 (2.2) | - | - |
| Abscess  | 0 | 1 (4.6) | - |

a MRSA infection in skin/soft tissue ranged between min 1 to max 9 patients in the same hospital.

b MRSA infection in bloodstream ranged between min 1 to max 5 patients in the same hospital.

c MRSA infection causing pneumonia ranged between min 1 to max 3 patients in the same hospital.

d Each of VRE infection in urinary tract occurred in one hospital.

e ESBL infection in bloodstream ranged between min 1 to max 5 patients in the same hospital.

 f ESBL infection in urinary tract ranged between min 1 to max 10 patients in the same hospital.

**Appendix Table 2. Frequency of MRSA screening sites and univariate association with colonization and infection prevalence**

|  |  |  |  |
| --- | --- | --- | --- |
| **Sites routinely sampled for MRSA screening** | **Frequency (n hospitals (%))** | **Crude OR** **(95% CI)** **for 2016 survey** | **P value** |
| **2010 (n = 174)** | **2012 (n = 143)** | **2016 (n = 160)** |
| Nose | 173 (98.43) | 143 (100) | 159 (99.38) | - |  |
| Nasal only (vs nasal and other extranasal) | 165 (94.83) | 138 (96.50) | 146 (91.25) | 0.99 (0.84-1.17) | 0.920 |
| Perianal/perineal/rectal/groin | 133 (76.44) | 112 (78.32) | 120 (75.47) | 1.19 (1.05-1.35)\* | <.0001 |
| Skin wounds or ulcers | 155 (89.08) | 125 (87.41) | 131 (82.39) | 1.01 (0.89-1.15)\* | 0.844 |
| Catheter exit sites | 98 (56.32) | 78 (54.55) | 88 (55.35) | 1.12 (1.01-1.23)\* | 0.0293 |
| Other  | 45 (25.86) | 28 (19.58) | 7 (4.40) | 0.66 (0.48-0.93)\* | <.0001 |
| Axilla | 8 (4.60) | 8 (5.59) | 7 (4.40) | 0.49 (0.36-0.67)\* | <.0001 |
| Throat/pharynx | 7 (4.02) | 2 (1.40) | 4 (2.52) | 0.46 (0.29-0.73)\* | 0.0011 |
| One site only | 8 (4.60) | 5 (3.50) | 13 (8.18) | Reference |  |
| 2 sites | 15 (8.62) | 16 (11.20) | 23 (14.47) | 0.96 (0.77-1.19) | 0.699 |
| 3 sites | 56 (32.18) | 47 (32.87) | 47 (29.56) | 0.87 (0.72-1.05) | 0.147 |
| ≥4 sites  | 95 (54.60) | 75 (52.45) | 76 (47.80) | 1.08 (0.91-1.29) | 0.394 |
| <4 sites | 79 (45.40) | 68 (47.55) | 83 (52.20) | Reference |  |
| ≥4 sites  | 95 (54.60) | 75 (52.45) | 76 (47.80) | 1.19 (1.08-1.31) | <.0001 |

\* Univariate analysis of screening vs no screening for each site

**Appendix Table 3. Univariate analyses of hospital characteristics, and infection prevention and control policies associated with the prevalence of antibiotic resistant organisms in Canadian hospitals (2016, n = 160)**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Variable** | **MRSA Colonization/Infection** | **MRSA Infection** | **VRE Colonization /Infection** | **CDI Infection** |
| **Crude OR** **(95% CI)** | **P value** | **Crude OR** **(95% CI)** | **P value** | **Crude OR** **(95% CI)** | **P value** | **Crude OR** **(95% CI)** | **P value** |
| **Hospital size (beds)** |  |  |  |  |  |  |  |  |
| < 200  | Reference |  | Reference |  | Reference |  | Reference |  |
| 200-500 | 0.97 (0.86-1.09) | 0.569 | 0.87 (0.64-1.17) | 0.340 | 1.05 (0.89-1.24) | 0.557 | 1.19 (0.94-1.51) | 0.143 |
| >500 | 1.05 (0.89-1.24) | 0.588 | 1.01 (0.66-1.56) | 0.954 | 1.74 (1.41-2.15) | <.0001 | 1.44 (1.04-1.99) | 0.027 |
| **Hospital size >200 beds** | 0.98 (0.88-1.10) | 0.719 | 0.89 (0.67-1.19) | 0.424 | 1.13 (0.96-1.32) | 0.147 | 1.23 (0.97-1.55) | 0.085 |
| **Occupancy rate** | 1.00 (0.99-1.001) | 0.156 | 0.99 (0.98-1.00) | 0.090 | 1.0 (0.99-1.004) | 0.981 | 0.999 (0.994-1.005) | 0.776 |
| **Teaching hospital** | 0.87 (0.79-0.96) | 0.007 | 0.80 (0.61-1.03) | 0.085 | 1.15 (0.998-1.33) | 0.053 | 0.92 (0.75-1.12) | 0.392 |
| **No. FTE ICP/100 beds** | 1.06 (0.97-1.17) | 0.188 | 0.88 (0.68-1.14) | 0.339 | 0.77 (0.67-0.89) | 0.0002 | 1.13 (0.95-1.34) | 0.180 |
| **Services provided/units**  |  |  |  |  |  |  |  |  |
| Hemodialysis  | 1.11 (0.99-1.24) | 0.075 | 1.14 (0.85-1.53) | 0.372 | 1.47 (1.25-1.73) | <.0001 | 1.15 (0.93-1.43) | 0.202 |
| Bone marrow transplant  | 0.89 (0.78-1.01) | 0.064 | 0.68 (0.47-0.99) | 0.044 | 1.26 (1.08-1.48) | 0.0044 | 0.90 (0.70-1.16) | 0.408 |
| Solid organ transplant | 0.99 (0.87-1.11) | 0.827 | 0.92 (0.66-1.27) | 0.608 | 1.99 (1.72-2.29) | <.0001 | 1.29 (1.04-1.61) | 0.024 |
| Cardiac surgery | 0.96 (0.86-1.07) | 0.464 | 1.11 (0.84-1.45) | 0.472 | 0.82 (0.71-0.96) | 0.012 | 0.90 (0.73-1.11) | 0.323 |
| Neurosurgery | 0.93 (0.84-1.03) | 0.187 | 1.13 (0.87-1.48) | 0.359 | 1.15 (1.00-1.32) | 0.0454 | 0.95 (0.78-1.17) | 0.639 |
| Trauma program | 1.00 (0.91-1.10) | 0.985 | 1.11 (0.86-1.44) | 0.416 | 0.77 (0.67-0.88) | <.0001 | 0.85 (0.70-1.03) | 0.106 |
| Burn unit | 0.88 (0.76-1.00) | 0.058 | 0.66 (0.44-0.98) | 0.041 | 0.73 (0.59-0.89) | 0.0019 | 0.73 (0.55-0.97) | 0.029 |
| Chemotherapy | 0.86 (0.77-0.95) | 0.005 | 0.66 (0.50-0.86) | 0.002 | 0.75 (0.65-0.87) | <.0001 | 0.87 (0.71-1.07) | 0.196 |
| Radiotherapy | 0.99 (0.90-1.10) | 0.899 | 0.75 (0.57-0.98) | 0.036 | 0.94 (0.82-1.07) | 0.341 | 0.90 (0.74-1.10) | 0.298 |
| Long-term care facility | 0.81 (0.71-0.92) | <.0001 | 0.70 (0.50-0.99) | 0.043 | 0.72 (0.60-0.86) | <.0001 | 0.99 (0.78-1.24) | 0.905 |
| Pediatrics unit | 0.93 (0.84-1.02) | 0.115 | 0.80 (0.62-1.04) | 0.089 | 0.99 (0.86-1.13) | 0.862 | 0.89 (0.74-1.08) | 0.224 |
| Neonatal ICU | 0.96 (0.87-1.05) | 0.359 | 1.02 (0.79-1.32) | 0.859 | 1.01 (0.88-1.16) | 0.892 | 0.91 (0.75-1.10) | 0.343 |
| Obstetrics | 0.99 (0.88-1.12) | 0.890 | 1.12 (0.81-1.54) | 0.488 | 0.84 (0.72-0.99) | 0.0319 | 1.07 (0.85-1.36) | 0.556 |
| **Targeted vs universal admission screeninga**  | 1.25 (1.12-1.40) | 0.0001 | 0.47 (0.33-0.68) | <.0001 | 0.86 (0.73-1.01) |  |  |  |
| Periodic prevalence screening of inpatients units | 0.96 (0.87-1.06) | 0.437 | 1.02 (0.78-1.33) | 0.887 | 0.82 (0.71-0.94) | 0.0051 |  |  |
| **Sites routinely sampled for screening** |  |  |  |  |  |  |  |  |
| Nasal only (vs nasal+other extranasal) | 0.99 (0.84-1.17) | 0.920 | 1.49 (0.89-2.47) | 0.126 |  |  |  |  |
| **Routine MRSA decolonizationb** | 0.53 (0.43-0.65) | <.0001 | 0.44 (0.25-0.79) | 0.006 |  |  |  |  |
| **NAAT testing for *C. difficile*c** |  |  |  |  |  |  | 1.06 (0.82-1.38) | 0.639 |

CDI *Clostridium difficile* infection; CI, confidence interval; FTE, Full-time equivalent; ICP, infection control professional; ICU, intensive care unit; MRSA, methicillin-resistant *Staphylococcus aureus*; NAAT, nucleic acid amplification tests, OR, odds ratio; VRE, vancomycin-resistant *Enterococcus*.

aTargeted screening for MRSA or VRE at admission to hospital on the basis or risk factor assessment.

bMRSA decolonization with intranasal mupirocin with or without use of the topical or systemic agent.

c Polymerase chain reaction (PCR) was used in 76% of hospitals (n = 122), Toxin assay (EIA) in 57% (n = 91), cytotoxin assay in 7.5% (n = 12), and toxigenic culture in 1% (n = 2). Overall, 59% of hospitals used only one technique (n = 95) and 65 hospitals used 2 or 3 techniques.