Canadian Nosocomial Infection Surveillance Program

MRSA Surveillance Protocol

Surveillance for Methicillin-resistant *Staphylococcus aureus* (MRSA) In CNISP health care facilities

Version December, 2006

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INTRODUCTION

Prior to 1995, national data describing the incidence and epidemiology of MRSA in Canada were not available. In 1995, national surveillance for MRSA was started in sentinel hospitals participating in the Canadian Nosocomial Infection Surveillance Program (CNISP) and has been ongoing.

The Canadian Nosocomial Infection Surveillance Program (CNISP) is a collaborative effort of the Canadian Hospital Epidemiology Committee (CHEC), a subcommittee of the Association of Medical Microbiologists and Infectious Disease (AMMI) and the Centre for Infectious Disease Prevention and Control (CIDPC) of the Public Health Agency of Canada.

Established in 1994, the objectives of CNISP are to provide rates and trends on nosocomial infections at Canadian health care facilities thus enabling comparison of rates (benchmarks), and providing evidence-based data that can be used in the development of national guidelines on clinical issues related to nosocomial infections. As of the year 2006, 48 sentinel CHEC sites (which may be networks of more than one hospital), with 8 paediatric stand alone sites and 29 CHEC members from 9 provinces participate in the CNISP network.

CHEC members participate in CNISP by working on sub-committees that direct the development, implementation and analysis of surveillance projects in CNISP. CHEC hospitals will often have ICP representative sitting on these committees. CHEC members participate voluntarily in CNISP projects by collecting standardized, case-by-case, non-nominal data on hospitalized patients. The data is submitted to CNISP for compilation and analysis.

MRSA data collected reflects all "newly-identified" MRSA cases from the CHEC hospitals. Colonized MRSA cases who are identified in prevalence surveys or during outbreak investigations are included in the data. If these cases should become infections this will not be picked up since cases are only included once unless reinfected at another time with a different strain. The rates provided therefore reflect these limitations (CHEC site only and only "newly identified" cases) and should be interpreted with this in mind.

GOALS AND OBJECTIVES

The objectives of this surveillance project are as follows:

1. To determine the incidence and burden of illness associated with MRSA in CNISP hospitals.
2. To describe the epidemiology of MRSA in Canada.
3. To characterize the molecular strains of MRSA in Canada.

METHODOLOGY

MRSA surveillance inclusion criteria

MRSA case definition:

- isolation of *Staphylococcus aureus* from any body site

AND

- resistance of isolate to oxacillin

AND

- patient must be admitted to the hospital.

AND

- is a "newly identified MRSA cases" at a CHEC facility
    - This includes:
        - MRSA cases identified for the first time;
        - Cases that have been previously identified at other non-CHEC sites (since we want newly identified MRSA cases at CHEC sites)
        - Cases that have already been identified at your site but are new cases. This can only be identified if the previously identified case has another strain. This means the person was exposed again to MRSA and acquired another strain of it from another source (a new Patient identifier should be assigned).

This DOES NOT include:

- MRSA cases previously identified at other CHEC sites
- Emergency, clinic or other outpatient cases
- Cases re-admitted with MRSA (unless it is a different strain)

Healthcare-associated definition:
Once the patient has been identified with MRSA, they will be classified as healthcare-associated based on the “best judgment” of the practitioner. This judgment should include review of:

- length of time in hospital prior to MRSA identification (generally >72 hours)
- knowledge of previous MRSA status
- date of admission
- length of stay in hospital
- prior hospitalization or other healthcare facility history (previously admitted in past 12 months)
- where patient admitted from (e.g., long-term care)

Newborn healthcare-associated case definition:
A MRSA case in a newborn may be considered as healthcare associated if the mother was not known to be a case on admission and where there is no epidemiological reason to suspect that the mother was colonized prior to admission, even if the newborn is < 48 hours of age.

In the case of a newborn transferred from another institution, MRSA may be classified as healthcare-associated if the organism was not known to be present and there is no epidemiological reason to suspect that acquisition occurred prior to transfer.

Community case definition:

No established health-care associated risk factors, and:

(i) hospitalized < 72 hours;
(ii) no previous history of MRSA;
(iii) no medical devices such as urinary catheters, IV lines, feeding tubes, tracheostomy, dialysis access, etc.
(iv) no history of hospitalization, surgery, or dialysis within 1 year of MRSA culture;
(v) not in residence at a long term care facility within 1 year of MRSA culture.

Data collection

Epidemiological data

Surveillance for MRSA is laboratory-based. Upon laboratory identification of MRSA from an in-patient for the first time, the infection control professional (ICP) is to be notified. A chart review to collect the patient's demographic and clinical information will then be conducted and data recorded.

Data elements will include:

- Unique identifier
- Date of birth
- Sex
- Ethnicity
- Culture date
- Reason for the culture
- Where MRSA was acquired (nosocomial or community)
- Anatomical site of MRSA isolation

Data will be collected using standardized data extraction forms that are revised at the beginning of every year (Appendix B). Any revisions to the form are to be made by the MRSA working group. Suggestions for revisions to the data extraction forms are collected throughout the surveillance year and then discussed with the working group at the end of the year. Those collecting the information are encouraged to make comments to improve the surveillance mechanism. Definitions and additional instructions for the completion of this form are provided in Appendices C and D.

WEBBS data entry

All MRSA cases are to be entered into the WEBBS internet surveillance data entry screens. Data can be changed in the case of errors in data, however data should not be updated if status changes from colonized to infected if patient was initially identified as colonized.

Denominator data - Rates
To obtain the necessary denominator information for the calculation of national MRSA rates, each participating health care facility has been completing a hospital profile on an annual basis. Data collected on this profile includes the number of *Staphylococcus aureus* isolates tested each year, the annual number of patient hospital admissions and the annual number of patient days spent in-hospital.

Laboratory data
MRSA isolates will be sent to the National Microbiology Laboratory (NML) in Winnipeg. Upon arrival, the cultures will be streaked for purity and stored. A duplicate set of strains will be sent to Sunnybrook lab for storage and additional testing. The strains will be confirmed as being MRSA using PCR to detect the *mecA* gene. Susceptibility testing and molecular typing using pulsed-field gel electrophoresis (PFGE) will also be conducted on submitted isolates. In certain cases, some strains will be further characterized using multi-locus sequence typing, identification of the Panton-Valentine Leukocydin (PVL) toxin, and *Staphylococcal* chromosomal cassette *mec* (SCCmec) typing.

Year 2007 Criteria for isolates:

Only clinical isolates that result in infection are to be sent to the lab. Therefore any isolates that are only colonized or clinical isolates that do not result in an infection do not need to be sent to the National Microbiology Lab (NML). It is therefore essential that ICP communicate to their laboratories which isolates (infected cases only) need to be saved and sent to the NML since the lab will not be able to determine this. The present criterion is different from past years' requirements. This new criterion for sending only infected clinical isolates will significantly decrease the number of isolates previously sent. Large and small number (MRSA) sites are to send in ALL of their infected clinical isolates.

Isolates should be sent to the following address:

Dr. Michael Mulvey
National Microbiology Laboratory
1015 Arlington St.
Winnipeg, Manitoba
R3E 3R2
Tel: 204-789-2133
Use FedEx billing number: 2299-8435-7

Surveillance Period
Surveillance for MRSA was initiated in January 1995 and will continue to be an ongoing CNISP surveillance project.

ANALYSIS AND EVALUATION

Patient data collection forms will be completed at the CHEC sites and entered into the CNISP WEBBS surveillance site via the internet or batched and sent monthly to the Nosocomial and Occupational Infections Section (NOI) of the Public Health Agency of Canada for data entry.

National rates of MRSA will be calculated by patient days, *Staphylococcus aureus* isolates tested, and per patient admissions. Regional and national rates will be published. The incidence of MRSA among hospitalized patients, geographic trends and descriptive epidemiology of MRSA will be reported via CNISP reports, presentations and publications.

ETHICS

While this surveillance project is observational and does not involve any alteration in patient care, ethics approval may be sought at some hospital sites. Surveillance for nosocomial infections is a routine component of quality assurance and patient care in Canadian health care institutions and therefore informed consent is not required. A unique identifier linked to patient name will only identify patients at the local CHEC site and is not transmitted to the Public Health Agency of Canada. All data submitted is kept strictly confidential.

Attached Appendices:

Appendix A: MRSA patient questionnaire
Appendix B: Case definitions and data dictionary

Appendix A:

Surveillance of Methicillin Resistant *Staphylococcus aureus* (MRSA) A Newly Diagnosed Patient Questionnaire 2007

1.	CHEC Site # (see attached detail notes for explanation)	
2.	Unique Identifier Code (must include site #, year and three digit consecutive code e.g. 07A-07-001)	
3.	Date of Birth	_____/_____/_____ DD MMM YYYY
4.	Date of Admission	_____/_____/_____ DD MMM YYYY
5.	Sex	☐ Male ☐ Female
6.	Ethnicity	☐ Not First Nations ☐ First Nations ☐ Unknown
7.	What was the date of this patient's newly identified MRSA culture?	_____/_____/_____ DD MMM YYYY
8.	Why was the first culture done? (Check one answer only)	☐ Admission screen ☐ Other screening ☐ Clinical isolate ☐ Other indication (please specify): _____
9.	Where was the MRSA acquired? (Check one answer only)	Health-care associated □ your facility □ another acute-care facility □ a long-term care facility □ another healthcare exposure ☐ Community-associated *(hospitalized < 72 hours, no previous history of MRSA, no hospital or long-term care admission in previous 12 months, no medical devices)* *If community, give the postal code of the patients' home address (first 3 digits only)* ___ ___ ___ ☐ Unknown

10.	Is this patient epidemiologically linked to others within your institution?	☐ Yes ☐ No

11.	At which site(s) has MRSA been isolated (positive culture obtained)?		
	Site of positive culture [1] (check each positive site)	**Infected or Colonized**	
	☐ Blood	☐ Infected	
	☐ Surgical Wound	☐ Infected	☐ Colonized
	☐ Other skin or soft tissue/burn	☐ Infected	☐ Colonized
	☐ Sputum / Respiratory	☐ Infected	☐ Colonized
	☐ Urine	☐ Infected	☐ Colonized
	☐ Nose		☐ Colonized
	☐ Rectum / Peri-anal / Perineum	☐ Infected	☐ Colonized
	☐ Other (please specify):_____ _____	☐ Infected	☐ Colonized

12.	What type of infection? (At the time patient was initially identified, within 72 hours of initial culture or associated with this episode by the best judgement of the ICP)	Check all that apply ☐ no infection ☐ urinary tract infection ☐ necrotizing fasciitis □ surgical wound □ other (please specify): _____ _____ ☐ pneumonia, non-necrotizing ☐ necrotizing pneumonia ☐ soft tissue infection, non-necrotizing ☐ surgical wound, non-necrotizing ☐ osteomyelitis ☐ catheter-related blood stream infection ☐ bacteremia, no source identified ☐ endocarditis ☐ meningitis ☐ conjunctivitis ☐ septic arthritis/bursitis ☐ other (please specify)_____ _____

APPENDIX B:

MRSA Questionnaire Data Dictionary- definitions and notes

The numbers in these instructions correspond with the numbers of the questions on the surveillance form.

1. **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.

2. **Unique identifier:**
This number should never be longer than 8 characters. The 8 characters should consist of the 3-character CHEC site # (e.g., 09A), the Year the MRSA case occurred in (e.g., 05), and a consecutive number starting at 001 and continuing on with each additional case. An example of the first case in an Institution would be 09A05001. An example of the thirty-fifth case would be 09A05035, and so on. Include this ID on the lab isolate. If this is a re-infection please assign a new patient identifier.

3. **Date of Birth:**
Please enter Day (##), Month (e.g., May) and Year (2006) in this order

4. **Date of Admission:**
Please enter Day (##), Month (e.g., May) and Year (2006) in this order of the date of admission to hospital as an inpatient.

5. **Sex:**
Check male or female gender as appropriate

6. **Ethnicity:**
Ethnicity will be defined by the patient. When completing the questionnaire ask the patient, “Do you consider yourself a member of Canada’s First Nation peoples, for example, Inuit, Aboriginal, Indian, Metis etc.” If the patient answers ‘yes’ to the above question please check ‘First Nations’. If the patient does not answer ‘yes’, check ‘not-First Nations’.

7. What was the date of this patients' newly diagnosed positive MRSA culture:

MRSA culture defined as a *S. aureus* with oxacillin MIC >=4 mg/ml, growing on oxacillin screen plate and the presence of PBP2a detected by latex agglutination test. Enter Day (##) Month (e.g., May) and Year (2006) for only the newly diagnosed (Incident) MRSA cases.

8. Why was the culture done: Check the appropriate response

Admission Screening - This culture was done as part of a protocol on admission that requires patients to submit to a series of tests to determine the presence or absence of MRSA.

Clinical Isolate - These cultures were obtained because a physician ordered the culture as a result of some clinical indication or suspicion of infection.

Other screen- These cultures were taken in the course of working-up an outbreak or cluster, contact screen, transfer screen, prevalence screen or other screening for MRSA. These cultures would not have been taken routinely nor would they have been taken as a clinical isolate.

Other indication- this includes any other indication not listed above.

9. Where was the MRSA acquired?

Healthcare-associated:

Once the patient has been identified with MRSA, they will be classified as healthcare-associated based on the "best judgment" of the practitioner. This judgment should include review of:

- length of time in hospital prior to MRSA identification (> 72 hours)
- knowledge of previous MRSA status
- date of admission
- length of stay in hospital
- prior hospitalization history (previously admitted in past 12 months)
- where patient admitted from

Newborn nosocomial case definition:

A MRSA case in a newborn may be considered as healthcare-associated if the mother was not known to be a case on admission and where there is no epidemiological reason to suspect that the mother was colonized prior to admission, even if the newborn is < 48 hours of age. In the case of a newborn

transferred from another institution, MRSA may be classified as healthcare-associated if the organism was not known to be present and there is no epidemiological reason to suspect that acquisition occurred prior to transfer.

Community case definition:
No established health-care associated risk factors, and:

(vi) hospitalized < 72 hours;
(vii) no previous history of MRSA;
(viii) no medical devices such as urinary catheters, IV lines, feeding tubes, tracheostomy, dialysis access, etc.
(ix) no history of hospitalization, surgery, or dialysis within 1 year of MRSA culture;
(x) not in residence at a long term care facility within 1 year of MRSA culture.

10. Epidemiological link:

This refers to MRSA thought to be epidemiologically linked to another person with MRSA in your facility through (e.g., common exposures, shared rooms, contact with implicated health care worker, contact with another patient with MRSA). Using your best judgement identify whether an epidemiological link has been established between this patient and any other known MRSA person in your facility. Check yes or no.

11. At which site(s) has MRSA been isolated (positive culture obtained)?

For this questions please complete the table:

1. Check the box(es) in the 'Culture positives' column for each site that MRSA has been isolated.
2. In the second column identify whether the positive culture represented an infection or colonization. MRSA infection is the presence of an infection, determined by the manifestations of signs and symptoms associated with MRSA infections. MRSA colonization is the presence of MRSA on skin, surgical wounds, skin, soft tissue, nose, sputum, urine or other which are <u>not</u> manifesting clinical signs and symptoms of infection.

12. What type of infection?

The type of infection identified in the patient using NNIS definitions/criteria. The time parameters around this include: at the time of culture or within 72 hours of the culture or that the infection was associated with the culture according to the best judgement of the ICP. These time parameters are set as such to make it easy for data collection and so that follow-up is not needed.