

Canadian Nosocomial Infection Surveillance Program (CNISP)

Surveillance of Vancomycin Resistant *Enterococci* Bloodstream Infections in CNISP Hospitals

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Working Group:

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Please enter/upload data to www.cnphi-rcrsp.ca

Ottawa: phac.cnisp-pcsin.aspc@canada.ca

NML: phac.nml.ARNI-RAIN.lnm.aspc@canada.ca

BACKGROUND

Enterococci are bacteria that live in the human intestine, in the female genital tract and are often found in the environment. Generally these bacteria do not cause illness. Vancomycin-resistant *Enterococci* (VRE) are strains of enterococci that are resistant to the antibiotic vancomycin. A person with VRE who has symptoms (e.g. an infection of the urinary tract or bloodstream) is infected with VRE.

VRE infections occur most commonly among people in hospitals with weakened immune systems; those who have been previously treated with vancomycin or other antibiotics for long periods of time; those who have undergone surgical procedures and those with medical devices such as urinary catheters are at a higher risk of becoming infected with VRE.

VRE is usually spread from person to person by direct contact or by contact with contaminated surfaces. VRE can be present on environmental surfaces or on the hands of caregivers after contact with other people with VRE or after touching surfaces or objects contaminated with VRE (e.g. toilet seats, bedrails, door handles, soiled linens, stethoscopes etc.)

To diagnose a VRE infection, an appropriate sample is taken from the patient. Once the sample has been taken, the organism must be allowed to grow in the laboratory. If the organism tests positive for VRE, it is then tested to determine which antibiotics may be effective for treating the infection. VRE infections can be treated with a limited choice of antibiotics other than vancomycin.

OBJECTIVES

The objectives of this surveillance project are to:

1. To determine the incidence of VRE BSIs among CNISP hospitals.
2. To provide a Canadian benchmark for VRE BSIs rates.
3. To describe the epidemiology of VRE BSIs.
4. To characterize the susceptibility profile and molecular subtype of VRE BSI isolates.

METHODOLOGY

a) Inclusion criteria

- Isolation of *Enterococcus faecalis* or *faecium* from blood

AND

- Vancomycin MIC \geq 8 ug/ml

AND

- Patient must be admitted to the hospital

AND

Is a "newly identified VRE BSI" at a CNISP hospital at the time of hospital admission or identified during hospitalization.

A new VRE BSI is defined as a positive VRE blood isolate > 14 days after completing of therapy for a previous infection and felt to be unrelated to previous infection in accordance with best clinical judgement by Infection Control physicians and practitioners

b) Exclusion criteria

- Emergency, clinic, or other outpatient cases who are **not admitted** to the hospital.

DATA REPORTING

An algorithm (Appendix 1) has been provided to assist in surveillance.

a) Infections

Please note: as of January 2018 only VRE BSIs should be reported

For each **VRE BSI** that meets the above criteria a patient questionnaire (Appendix 2) should be completed by reviewing the patients' chart and reported to the Public Health Agency of Canada (PHAC).

For patients with more than one VRE BSI during the same calendar year, **NEW** infections are to be identified by entering as a new case and 'linking' to the patient's original VRE BSI by entering the original unique patient identifier at the end of the patient questionnaire.

Once the patient has been identified with a VRE BSI, they will be classified as healthcare-associated acquired in your acute-care facility, healthcare-associated any other healthcare exposure or community-associated based on the following criteria and in accordance with the best clinical judgement of the healthcare and/or infection prevention and control practitioner (ICP).

Healthcare-associated (HA) your acute-care facility:

- Patient is on or beyond calendar day 3¹ of their hospitalization

OR

- Has been hospitalized in your facility in the last 7 days or up to 90 days² depending on the source of infection

OR

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

Healthcare-associated (HA) any other healthcare exposure:

- Any patient who has a bacteremia not acquired at your facility that is thought to be associated with any other healthcare exposure (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 bacteremia (using best clinical judgement³) and does not meet the criteria for a healthcare-associated BSI.

¹ Calendar day 1 is the day of hospital admission

²For example, a VRE bacteremia from a surgical wound that occurs 3 weeks after a surgical procedure completed in your facility should be considered HA - your acute-care facility (up to 90 days after procedure if implant). A VRE bacteremia secondary to UTI occurring >7 days after discharge from your facility should not be considered HA – your acute-care facility.

³ 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.

b) Denominator data

Denominator data will be collected on the quarterly denominator form.

The data collected will include:

1. total number of hospital admissions per year
2. total number of patient-days per year

c) Electronic data entry and submission

All patient questionnaire and denominator data should be submitted to the Agency online through the Canadian Network for Public Health Intelligence (CNPHI) at www.cnphi-rcrsp.ca. For technical assistance, questions or comments, please contact CNISP at phac.cnisp-pcsin.aspc@canada.ca.

Please submit data quarterly as follows:

- Cases from January 1st through March 31st: submit to CNISP by June 30th
- Cases from April 1st through June 30th: submit to CNISP by September 30th;
- Cases from July 1st through September 30th: submit to CNISP by December 31st
- Cases from October 1st through December 31st: submit to CNISP by March 31st of the following year

For any quarter with no cases at your site, a Zero Report must be made in the CNPHI VRE module so that quarters with zero counts can be differentiated from missing data.

LABORATORY REPORTING

Blood Isolates: One blood isolate is required for every eligible VRE BSI and submitted to the NML. For patients with more than one VRE BSI in a calendar year, please indicate the patient's previous unique patient ID on the shipping form (Appendix 4).

Mandatory Shipping Form: Each shipment of eligible VRE blood isolates must be accompanied by a standardized shipping form. Please complete the template found in Appendix 4 and ensure it is included in the shipment. Please note that Appendix 4 must be included with the shipment **AND** emailed to the NML at phac.nml.ARNI-RAIN.Inm.aspc@canada.ca.

Instructions for submitting laboratory specimens:

Vancomycin-resistant *E. faecium* and *E. faecalis* isolated from a blood infection will be identified by the submitting lab's preferred methods (e.g. grows on a VRE screen plate and identified by phenotypic methods).

The isolate in pure culture and properly labelled with a CHEC number (in indelible ink/marker) should be stored by an appropriate method (i.e. swab at 4°C, cryobeads or glycerol stock at -20°C). Isolates can be stockpiled for bulk shipment to the NML.

Unique patient ID must use the following syntax: Site number (alphanumeric) e.g. 01A, year (2 digits) e.g. 18, strain number (3 digits) e.g. CHEC #, would be 01AYY001.

Note: The unique patient ID for the isolate must match the unique patient ID on the corresponding submitted VRE questionnaire.

Isolates should be sent to the following address:

Dr. George Golding
National Microbiology Laboratory
1015 Arlington St.
Winnipeg, Manitoba, R3E 3R2
Tel: 204-784-8096

Use FedEx billing number: 2299-8435-7

DATA ANALYSIS

Regional and national BSI rates (per 1,000 admissions and per 10,000 inpatient-days), descriptive epidemiology, sequence type and resistance data will be calculated each year by PHAC and NML staff. Rates will be reported through PHAC surveillance reports, presentations, publications, and published on the Agency and/or AMMI website.

ETHICS

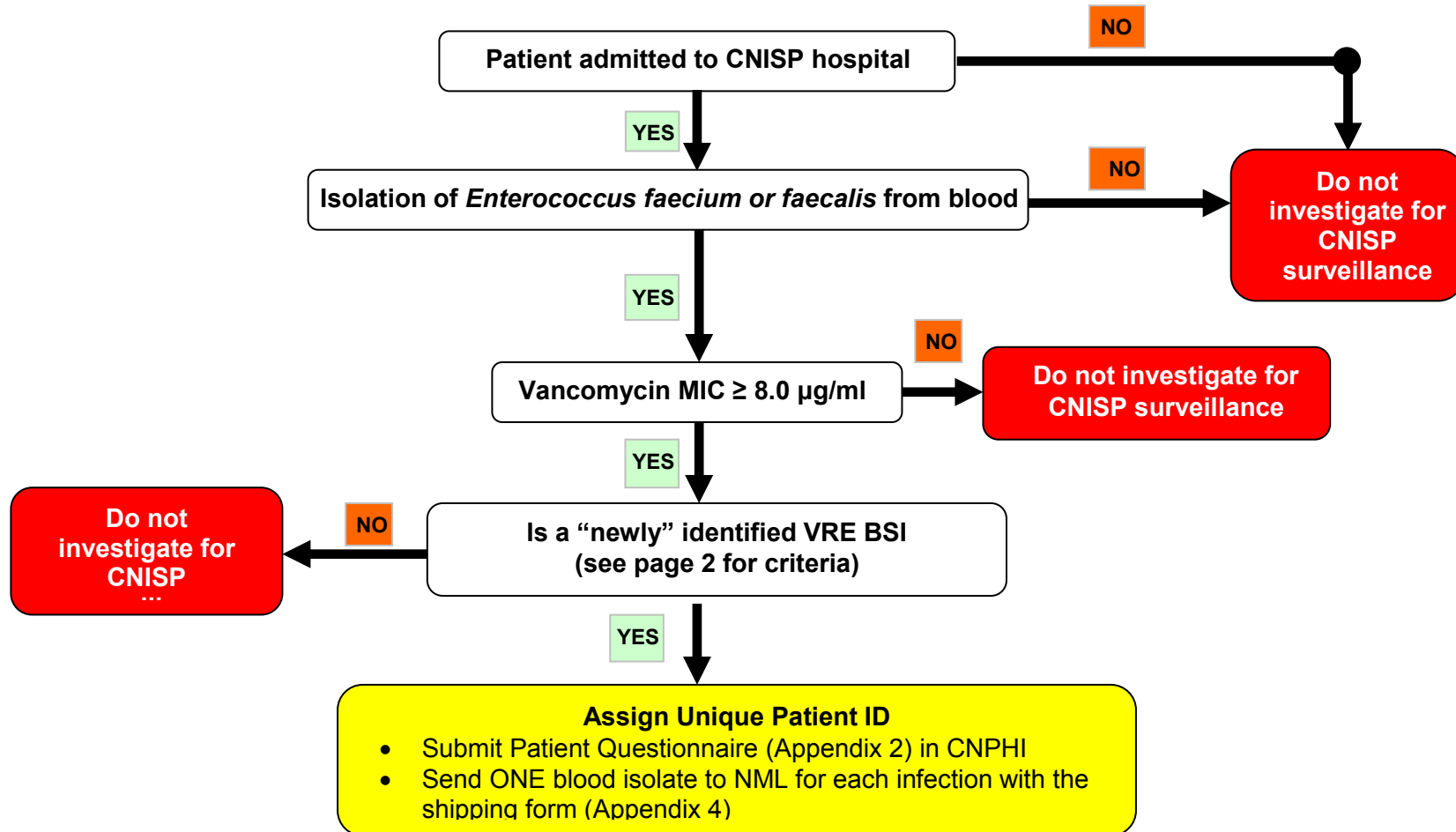
While this surveillance project is observational and does not involve any alteration in patient care, ethics approval may be sought at some hospital sites. Surveillance for healthcare-associated infections is a routine component of quality assurance and patient care in Canadian healthcare institutions 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 Agency. All data submitted to the Agency is kept strictly confidential.

Attached Appendices:

- Appendix 1 Algorithm for VRE BSI surveillance*
- Appendix 2 VRE BSI patient questionnaire*
- Appendix 3 Data dictionary for VRE BSI patient questionnaire*
- Appendix 4 CNISP VRE BSI Surveillance: Standard Laboratory Shipping Form*



APPENDIX 1 – Algorithm for VRE BSI Surveillance





Appendix 2 - VRE BSI Patient Questionnaire

Please note: this form is only to be completed for bloodstream infections

1. Does this patient meet the criteria for a VRE bloodstream infection ?	
<input type="checkbox"/> Yes – If yes, please complete the remainder of the questionnaire. <input type="checkbox"/> No – If no, do NOT complete this questionnaire.	
2. CHEC Site: _____	
3. Unique Patient ID	_____ YY _____ <small>(CHEC site #) (year) (case number)</small>
4. Age _____	<input type="checkbox"/> Years <input type="checkbox"/> Months <input type="checkbox"/> Days
5. Postal code (first 3 digits) _____	
6. Sex	<input type="checkbox"/> Male <input type="checkbox"/> Female
7. Date of admission	____/____/_____ <small>(dd/mmm/yyyy)</small>
8. Date of patient's positive culture	____/____/_____ <small>(dd/mmm/yyyy)</small>
9. Source of blood infection:	
<input type="checkbox"/> IV catheter associated <input type="checkbox"/> Primary bacteremia (source unknown/cannot determine) <input type="checkbox"/> Skin or soft tissue/burn wound <input type="checkbox"/> Surgical site infection <input type="checkbox"/> Endocarditis <input type="checkbox"/> Urinary tract infection/urosepsis <input type="checkbox"/> GI (e.g. intraabdominal abscess, peritoneal fluid, ascending cholangitis etc.) <input type="checkbox"/> Mucosal barrier injury <input type="checkbox"/> Other, specify: _____	



10. Where was this VRE BSI acquired? (Check one response only)

- Healthcare-associated (your acute-care facility)
- Healthcare-associated (any other healthcare exposure)
- Community-associated
- Unknown

11. Was the patient receiving any of the following treatments at the time of positive blood culture?

Check **all** that apply

- No
- Chemotherapy
- Radiation therapy
- Hemodialysis
- Peritoneal dialysis
- Unknown

12. Did the patient have a central venous catheter⁴ at the time of positive blood culture?

- Yes
- No
- Unknown

13. Was the patient a bone marrow or stem cell transplant recipient?

- Yes, please specify date of procedure: ____/____/____
(dd/mmm/yyyy)
- No
- Unknown

14. Was the patient a solid organ transplant recipient?

- Yes, please specify date of procedure: ____/____/____
(dd/mmm/yyyy)
- No
- Unknown

⁴ Central Venous Catheter (CVC) include non-tunneled (standard) CVC, coated or not, peripherally inserted CVC (PICC), tunneled devices (e.g. Broviac, Hickman), tunneled haemodialysis line, intra-cardiac catheters such as intra-arterial & ventricular lines, dual function lines such as temperature/venous catheters (e.g. Cool line catheters, Quattro catheters, introducers etc.), pulmonary catheters, umbilical artery and vein catheters and implanted catheters (including ports).



15. Please indicate which treatment the patient received for the VRE BSI (please check all that apply):

- Linezolid
- Daptomycin
- Tigecycline
- Other, please specify: _____
- Unknown
- None

16. Please indicate which antimicrobials the patient received 30 days prior to their positive blood culture (please check all that apply):

- Vancomycin
- Fluoroquinolones
- Cephalosporins
- Carbapenems
- Penicillins
- Macrolides
- Linezolid
- Daptomycin
- Other, please specify: _____
- None
- Unknown

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

- Patient was already in an ICU at the time the positive blood culture was obtained
- Yes, please indicate the date of ICU admission: ____/____/____
(dd/mmm/yyyy)
- No
- Unknown

18. What was the outcome at 30 days from the date of positive blood culture?

- Patient discharged or transferred alive, please specify date: ____/____/____
(dd/mmm/yyyy)
- Patient still alive and in hospital
- Patient died, please specify date: ____/____/____
(dd/mmm/yyyy)
- Unknown

19. Is this a NEW infection in a patient previously identified with a VRE BSI in this surveillance year?

- No
- Yes, please enter the original/previous unique patient ID _____ YY _____
(CHEC site #) (year) (case #)



APPENDIX 3 – Data dictionary for VRE patient questionnaire

1. Does this patient meet the criteria for a VRE BSI INFECTION?

Refer to inclusion/exclusion criteria on page 2.

If the patient meets the criteria for a VRE BSI, please complete the remainder of this questionnaire. If the case does NOT meet the criteria for VRE BSI, please do NOT complete this questionnaire.

2. 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.

3. Unique patient ID

This 10 character code should consist of the 3 character CHEC site # (e.g., 09A), the surveillance year the infection occurred in (e.g., 18), 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 09A18001. An example of the thirty-fifth case would be 09A18035, and so on.

Note: Always label the laboratory isolate with this **same** unique patient ID.

As a patient may have more than one VRE BSI during the same calendar year, **NEW** infections are to be identified by entering as a new case and 'linking' to the patient's original VRE BSI by entering the original unique patient ID at the end of the questionnaire.

4. Date of birth

Please enter Day (##), Month (May) and Year (1973) in this order. If the date of birth is not available please enter the patient's age (in years, months or days) at the time of positive culture.

5. Postal code (first 3 digits)

Please indicate the patient's residential postal code (first 3 digits).

6. Sex

Check male or female as appropriate.

7. Date of admission

Indicate the date when the patient was admitted to the hospital.

8. Date of this patient's positive culture

For the current admission, please indicate when the positive blood isolate for VRE was obtained.

9. Source of blood infection

Please indicate the source of infection from which the positive blood culture was obtained.

10. Source of acquisition

Please indicate whether the BSI was acquired in a healthcare setting or in the community according to the following definitions. If the source of acquisition cannot be determined, please report as unknown.



Healthcare-associated (HA) your acute-care facility:

- Patient is on or beyond calendar day 3⁵ of their hospitalization

OR

- Has been hospitalized in your facility in the last 7 days or up to 90 days⁶ depending on the source of infection

OR

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

Healthcare-associated (HA) any other healthcare exposure:

- Any patient who has a bacteremia not acquired at your facility that is thought to be associated with any other healthcare exposure (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 bacteremia (using best clinical judgement⁷) and does not meet the criteria for a healthcare-associated BSI.

11. Receiving treatment at the time of positive blood culture

Please indicate if the patient was receiving any of the following treatments: chemotherapy, radiation therapy, hemodialysis, peritoneal dialysis at the time of positive blood culture.

12. Patient with central venous catheter (CVC) at the time of positive blood culture

Please indicate if the patient had a CVC at the time of positive blood culture. Central Venous Catheter (CVC) refers to non-tunneled (standard) CVC, coated or not, peripherally inserted CVC (PICC), tunneled devices (e.g. Broviac, Hickman), tunneled haemodialysis line, intra-cardiac catheters such as intra-arterial and ventricular lines, dual function lines such as temperature/venous catheters e.g. Cool line catheters, Quattro catheters, introducers etc., pulmonary catheters, umbilical artery and vein catheters and implanted catheters (including ports).

13. Bone marrow or stem cell transplant recipient

Please indicate if the patient was a bone marrow or stem cell transplant recipient. If yes, please specify the transplant date.

14. Solid organ transplant recipient

Please indicate if the patient was a solid organ transplant recipient. If yes, please specify the transplant date.

⁵ Calendar day 1 is the day of hospital admission

⁶For example, a VRE bacteremia from a surgical wound that occurs 3 weeks after a surgical procedure completed in your facility should be considered HA – your acute-care facility (up to 90 days after procedure if implant). A VRE bacteremia secondary to UTI occurring >7 days after discharge from your facility should not be considered HA – your acute-care facility.

⁷ 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.



15. Treatment for VRE BSI

Please indicate all of the treatment the patient received for their VRE BSI.

16. Antimicrobials exposure within past 30 days

Please indicate which antimicrobials the patient received 30 days prior to their positive blood culture.

17. ICU admission within 30 days

Please indicate if the patient was admitted or transferred to the ICU within 30 days following the date of positive blood culture.

18. Outcome at 30 days

Please indicate what the patient's outcome was at 30 days following the date of positive blood culture.

19. Is this a NEW infection in a patient previously identified with a VRE BSI in this surveillance year?

Please indicate whether this is a new infection in a patient previously identified with a VRE BSI in this surveillance year. If yes, please indicate the unique PID of the original/previous case



APPENDIX 4 - CNISP VRE BSI Surveillance: Standardized Laboratory Shipping Form

Appendix 4 must be included with the shipment **AND** emailed to the NML at phac.nml.ARNI-RAIN.Inm.aspc@canada.ca

Send isolates and Appendix 4 to:

Dr. George
Microbiology Laboratory
1015 Arlington St., Winnipeg, Manitoba R3E 3R2
Tel: 204-789-2133

Use FedEx billing number: 2299-8435-7
phac.nml.ARNI-RAIN.Inm.aspc@canada.ca

[PLEASE CLICK ON THE ICON BELOW TO ACCESS THE EXCEL SHIPPING FORM](#)



NML isolates shipping
form VRE.xlsx



Revision History

May 1, 2014 – Added question 9 to the questionnaire addressing the 30-day outcome of patients with VRE bacteremia.

October 30, 2014 – Began making changes to homogenize CNISP protocol formatting.

November 3, 2014 – ‘Case Definition’ renamed to ‘Inclusion Criteria’.

November 3, 2014 – ‘Numerator Data’ moved under ‘Inclusion Criteria’.

November 5, 2014 – ‘Introduction’ added (copied from VRE Report ‘Background’).

November 5, 2014 – ‘Data Analysis’ and ‘Ethics’ copied from the CDI protocol.

November 12, 2014 – Edited ‘Unique identifier code’ in the Data Dictionaries.

November 27, 2014 – Updated protocol to reflect 2015 surveillance year

December 29, 2014 – Added Q9-18 to collect additional data for blood stream infections only

October 30, 2015 – No collection of VRE colonization data as for 2016.

October 30, 2015 – Additional response category (other sterile site) added for the question of site of positive culture

October 30, 2015 – Additional question added for blood isolates: “Did the patient have a central venous catheter at the time of positive blood culture?”.

October 30, 2015 – Question 14 was changed from 3 months to 30 days prior to the positive blood culture.

December 29, 2016 – addition of antimicrobials for Q15. Addition of definitions for Surgical Wound and Urine in Data Dictionary.

November 10, 2017 – The following updates were made to the 2018 protocol:

- Surveillance of bloodstream infections only.
- Added additional sources of blood infection (Q9).
- Updated healthcare and community-associated definitions.
- Update to inclusion/exclusion criteria – defined new VRE BSI in the same calendar year.
- Added Q18 to the patient questionnaire - for patients with multiple VRE BSI in the same calendar year, indicate the original case PID.

October 15, 2018

- Removed all references to a specific surveillance year as protocol may not be updated annually.
- Added the following response options to source of blood infection: mucosal barrier injury and GI
- Added first 3 digits of postal code and removed DOB.