

Haemodialysis Event (HDE)

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1. Introduction

The VICNISS haemodialysis event (HDE) surveillance module is based on the National Health Safety Network (NHSN) Patient Safety Component Manual, Centers for Disease Control and Prevention (CDC) in the United States¹.

Haemodialysis (HD) patients require a vascular access, which can either be a catheter or a graft or an enlarged blood vessel that can be punctured to remove and replace blood. Bacteremias and localised infections of the vascular access site are common in haemodialysis patients²⁻⁷. The vascular access types, ordered according to increasing risk of infection, include arteriovenous fistulas created from the patient's own blood vessels; arteriovenous grafts often constructed from synthetic materials; tunneled central lines; and nontunneled central lines. Because of frequent hospitalisations and receipt of antimicrobial drugs, haemodialysis patients are at high risk for infection with drug-resistant bacteria.

2. Methodology

Haemodialysis event surveillance requires that all haemodialysis outpatients be monitored for any outpatient IV antimicrobial start; positive blood culture; or presence of pus, redness, or swelling at the vascular access site. Inpatients are not included in the surveillance.

Setting

Surveillance will occur in outpatients who are treated in outpatient haemodialysis centres. These centres may be attached to or affiliated with a hospital (hub or satellite), but should serve mostly hemodialysis outpatients.

Requirements

Refer to the [Type 1 VICNISS Performance Indicators](#) and [Type 2 VICNISS Performance Indicators](#) on the VICNISS website for required HDE surveillance activities. For further information also refer to the [VICNISS Type 1 Surveillance Manual \(section 4.1\)](#) and the [VICNISS Type 2 Surveillance Manual \(section 4.3\)](#) on the VICNISS website.

Definitions

The following types of haemodialysis events are determined with an algorithm from data and reported quarterly by VICNISS:

Local access infection: Pus, redness, or swelling of the vascular access site and access-associated bacteremia was not present and patient was hospitalised or had initiation of an IV antimicrobial agent.

Access-associated bacteremia: Blood culture positive with source identified as the vascular access site or unknown.

Vascular access infection: Either local access infection or access-associated bacteremia.

Criteria for Haemodialysis Events

IV antimicrobial start: Include all outpatient IV antimicrobial starts, not just those with vancomycin or for a vascular access problem. If IV antimicrobials are stopped for less than 21 days and then restarted, the second start is NOT considered a new haemodialysis event.

Positive blood culture: Include all positive blood cultures collected as an outpatient or collected within 1 calendar day after hospital admission. The date of a blood culture result is based on the date the blood specimen was collected, not the date the laboratory reported the result. There must be 21 or more days between positive blood cultures for each positive blood culture to be considered a separate haemodialysis event. If positive blood cultures occur less than 21 days apart, the second positive blood culture is NOT considered a new event.

Pus, redness or increased swelling at the vascular access site: Include each new episode where the patient has one or more symptoms of pus, redness or increased swelling at a vascular access site. There must be 21 or more days between the onset of a first and second episode of pus, redness, or swelling at a vascular access site to be considered separate haemodialysis events. If an episode of pus, redness, or swelling at a vascular access site resolves and then recurs within 21 days, the recurrence is NOT considered a new dialysis event.

Denominator Data

The number of chronic haemodialysis patients with each access type who received haemodialysis at the centre during the first two working days of the month is recorded on a VICNISS web based data collection form (web form) [Haemodialysis Event \(Denominator\)](#). These data are used to estimate the number of patient-months. Only haemodialysis outpatients are included. Each patient is counted only once; if the patient has multiple vascular accesses, record that patient once reporting their highest risk vascular access type only. For further explanation of required data fields see [Instructions for Completion of HDE Data Forms](#) on the VICNISS website. For more information on how to register and obtain access to web forms please see the [Web Based Data Collection Forms \(Web Forms\) User Guide](#) on the VICNISS website.

Numerator Data

For each patient with IV antimicrobial start; positive blood culture; or pus, redness, or swelling at the vascular access site (must meet HDE criteria), participating dialysis centers will complete one VICNISS web based data collection form (web form) [Haemodialysis Event \(Numerator\)](#). For further explanation of required data fields see [Instructions for Completion of HDE Data Forms](#) on the VICNISS website. For more information on how to register and obtain access to web forms please see the [Web Based Data Collection Forms \(Web Forms\) User Guide](#) on the VICNISS website.

Reporting multiple dialysis events for a single patient: if multiple dialysis events occur together, as a part of the same patient problem, they should be reported as one dialysis event. For example, if a patient has a positive blood culture and has an IV antimicrobial start, these two events would be recorded together as one dialysis event. When reporting multiple dialysis events together, always use the date from the first event that occurred. Refer to criteria for haemodialysis events (above) for the 21 day rule.

3. Data Analyses

The numbers of various haemodialysis events are tabulated, and rates of these events per 100 patient-months calculated by dividing the number of events by the number of patient-months and multiplying the result by 100. These rates are stratified by vascular access type and compared to the VICNISS aggregate rate.

4. References

1. Centers for Disease Control and Prevention. The National Healthcare Safety Network (NHSN) Manual. Patient Safety Component Protocol. 2010 www.cdc.gov/nhsn/TOC_PSCManual.html
2. Klevens RM, Edwards JR, Andrus ML, Peterson KD, Dideck MA, Horan TC. Dialysis Surveillance Report: National Healthcare Safety network (NHSN)-data summary for 2006. *Seminars in dialysis* 2008;21 (1):24-28.
3. Kessler M, Hoen B, Mayeux D, Hestin D, Fontenaille C. Bacteremia in patients on chronic hemodialysis. *Nephron* 1993;64:95-100.
4. Stevenson KB, Adcox MJ, Mallea MC, Narasimhan N, Wagnild JP. Standardized surveillance of hemodialysis vascular access infections: 18-month experience at an outpatient, multicenter hemodialysis center. *Infect Control Hosp Epidemiol* 2000;21:200-3.
5. Tokars JJ, Light P, Anderson J, Miller E, Parrish J, Armistead N, et al. A prospective study of vascular access infections at seven outpatient hemodialysis centers. *Am J Kidney Dis* 2001;37:1232-40.
6. Kaplowitz LG, Comstock JA, Landwehr DM, Dalton HP, Mayhall CG. A prospective study of infections in hemodialysis patients: patient hygiene and other risk factors for infection. *Infect Control Hosp Epidemiol* 1988;9:534-41.
7. Tokars J, Stein G, Frank M, the Dialysis Surveillance Network. The influence of blood culture frequency on reported bacteremia in hemodialysis outpatients. Abstract presented at the Society for Healthcare Epidemiology of America, Salt Lake City, UT, April 2002.

Instructions for Completion of HDE Forms

Please refer to the table below for instructions on each VICNISS data field.

HAEMODIALYSIS EVENT (DENOMINATOR)

Record the number of haemodialysis outpatients who received haemodialysis at your centre on the first two working days of the month on a [web form](#). Count each patient only once. If a patient has both an implanted access (graft or fistula) and a catheter, count the patient as having the catheter.

Data Field	Instructions for Data Collection
Hospital Code Number	Enter the VICNISS assigned hospital code number.
For Month of	Enter the name of the month during which the surveillance data was collected.
Year	Enter the year during which the surveillance data was collected
Arteriovenous Fistula	Record the number of patients that have an arteriovenous fistula created from their own blood vessels on the first two working days of the month.
Arteriovenous Graft	Record the number of patients that have an arteriovenous graft constructed from synthetic materials on the first two working days of the month.
Tunneled Central Line	Record the number of patients that have a tunneled central line e.g., permcath on the first two working days of the month.
Nontunneled Central Line	Record the number of patients that have a nontunneled central line on the first two working days of the month.
Total Patients (sum of all patients listed above)	Enter the total number of haemodialysis patients regardless of the type of vascular access on the first two days of the working month. Sum of all patients with fistula, graft and central lines (tunneled & nontunneled).

HAEMODIALYSIS EVENT (NUMERATOR)

A [web form](#) is to be completed for each haemodialysis event.

Data Field	Instructions for Data Collection
Hospital Code Number	Enter the VICNISS assigned hospital code number.
MRN (UR No.)	Enter the patient UR Number. This is the alphanumeric patient identifier assigned by the hospital and may consist of a combination of numbers, letters, spaces, dashes or leading zeroes, e.g., 000-123-A.
Sex	Select male or female to indicate the gender of the patient.
DOB	Enter the date of the patient's birth using this format: day/month/year (DD/MM/YYYY).

Data Field	Instructions for Data Collection
<p>Vascular Access</p> <p>1. Arteriovenous Fistula</p> <p> Access technique: Buttonhole or Rope ladder</p> <p>2. Arteriovenous Graft</p> <p> Access technique: Buttonhole or Rope ladder</p> <p>3. Tunneled Central Line</p> <p> Date of insertion:</p> <p>4. Nontunneled Central Line</p> <p> Date of insertion:</p>	<p>Select all vascular accesses (haemodialysis only) that the patient has from the picklist:</p> <p>Select if the patient has an AV fistula created from their own blood vessels.</p> <p>If AV fistula insitu indicate technique used to access fistula by selecting buttonhole or rope-ladder</p> <p>Select if the patient has an AV graft often constructed from synthetic materials.</p> <p>If AV graft insitu indicate technique used to access fistula by selecting buttonhole or rope-ladder</p> <p>Select if the patient has a tunneled central line eg. Permcath.</p> <p>Enter the date the tunneled central line was inserted. If date unknown, select Date not Available.</p> <p>Select if the patient has a nontunneled central line.</p> <p>Enter the date the non-tunneled central line was inserted. If date unknown, select Date not Available.</p>
<p>Date of Event</p>	<p>Enter date of this event using this format: DD/MM/YYYY</p> <p>Date depends on event type:</p> <ul style="list-style-type: none"> • For IV antimicrobial starts, enter the date the IV antimicrobial was started. • For positive blood cultures, enter the date the blood specimen was collected. • For pus, redness, or increased swelling at the vascular access site, enter the date of symptom onset
<p>Event Type</p>	<p>Select one or more of the events from the pick list:</p>
<p>IV antimicrobial start</p> <p>Was IV vancomycin started?</p>	<p>Select if patient is given (started) any IV antimicrobial agents as an outpatient for any reason: not only IV vancomycin starts and not only for vascular access problems. There must be 21 or more days from the end of the first IV antimicrobial start to the beginning of a second IV antimicrobial start for two starts to be considered separate dialysis events.</p> <ul style="list-style-type: none"> • If IV antimicrobials are stopped for less than 21 days and then restarted, the second start is NOT considered a new Haemodialysis event • If IV antimicrobials are stopped for 21 days or more and then restarted, this is considered a new event <p>If IV antimicrobial started, select Yes if the IV antimicrobial was vancomycin, otherwise select No.</p>
<p>Positive blood culture</p> <p>What was the suspected source of the positive blood culture?</p>	<p>Select if the patients blood culture is positive, even if it is thought to be unrelated to the vascular access. Include all positive blood cultures taken as an outpatient or within 1 calendar day after a hospital admission. Two positive blood cultures, based on the dates the blood samples were collected, must be 21 or more days apart to be considered separate positive blood culture dialysis events. Use the most recent positive blood culture when applying the 21 day rule.</p> <p>If positive blood cultures occur less than 21 days apart, based on the blood sample collection dates, the second positive blood culture is NOT considered a new dialysis event.</p> <p>Select the suspected source of the positive blood culture:</p>

Data Field	Instructions for Data Collection
<p>Vascular access</p> <p>Source other than the vascular access</p> <p>Contamination</p> <p>Uncertain</p>	<p>Select if there is objective evidence of vascular access infection and the vascular access is thought to be the source of the positive blood culture.</p> <p>Select if either (a) or (b) is true: a) a culture from another site (e.g., infected leg wound, urine) shows the same organism found in the blood and is thought to be the source of the positive blood culture b) there is clinical evidence of infection at another site and the other site is thought to be the source of the positive blood culture, but the site was not sampled for culture</p> <p>Select if the organism isolated from the blood culture is thought by the physician, infection control professional, or nurse manager to be a contaminant. Contamination is more likely if the organism is a common commensal and is isolated from only one blood culture. Examples of some common commensals include: diphtheroids [<i>Corynebacterium</i> spp.], <i>Bacillus</i> [not <i>B. anthracis</i>] spp., <i>Propionibacterium</i> spp., coagulase-negative staphylococci [including <i>S. epidermidis</i>], viridans group streptococci, <i>Aerococcus</i> spp., <i>Micrococcus</i> spp.</p> <p>Choose uncertain only if there is insufficient evidence to decide among the three previous categories</p>
<p>Pus, redness, or increased swelling at vascular access site</p> <p>Which vascular site was affected</p> <p>Was a surface swab collected</p> <p>If Yes, was an organism identified</p>	<p>Select if the patient has onset of pus, or greater than expected redness or swelling at a vascular access site.</p> <p>According to the picklist, select which vascular access site has pus, redness or increased swelling: arteriovenous fistula, arteriovenous graft, tunneled central line or nontunneled central line.</p> <p>Select Yes if vascular access site surface swab was collected, otherwise select No.</p> <p>Select Yes if organism identified from surface swab, otherwise select No. Specify organism details in Pathogen & Antimicrobial Susceptibility (below).</p>
<p>Problems Related to Event</p> <p>Fever ≥ 37.8 °C (oral)</p> <p>Chills or rigors</p> <p>Abnormal drop in blood pressure</p> <p>Wound (not related to vascular access) with pus or increased redness</p> <p>Cellulitis</p> <p>Pneumonia or respiratory infection</p> <p>Urine culture with >100,000 organisms/ml with not more than 2 species isolated</p> <p>Endocarditis (proven or suspected)</p>	<p>For each event select all that are present:</p> <p>Select if fever ≥ 37.8°C oral is present.</p> <p>Select if chills or rigors are present.</p> <p>Select if abnormal drop in blood pressure is present.</p> <p>Select if a wound that is unrelated to the vascular access site has pus or increased redness.</p> <p>Select if cellulitis is present at a site other than the vascular access and without open wound.</p> <p>Select if pneumonia or respiratory infection is present.</p> <p>Select if patient had a urine culture with >100,000 organisms/ml with not more than 2 species isolated. If the patient is thought to have a urinary tract infection but does not meet the criteria select “other” and specify “possible UTI”.</p> <p>Select if the patient had proven or suspected endocarditis (patient prescribed appropriate antimicrobial therapy for at least 28 days).</p>

Data Field	Instructions for Data Collection
<p>Other (specify)</p> <p>Nil</p>	<p>Record any other specific problem related to the event that does not meet the criteria or is not specified in the above picklist.</p> <p>Select if no other specific problems were related to the event</p>
<p>Outcome (related to the event)</p> <p>Hospitalisation</p> <p>Death</p>	<p>For each haemodialysis event complete this picklist:</p> <p>Select Yes if the patient was hospitalised related to the event or problem. Select No if patient was not hospitalised. Select Unknown if uncertain about whether or not the patient was hospitalised. .</p> <p>Select Yes if the patient died related to the event or problem. Select No if patient did not die. Select Unknown if uncertain about whether or not the patient died.</p>
<p>Site of Pathogen</p> <p>Blood Culture</p> <p> Name of Pathogen</p> <p>Surface swab (vascular access site)</p> <p> Name of Pathogen</p>	<p>Indicate the site where the pathogenic organism was cultured.</p> <p>Select if pathogen was cultured from blood culture.</p> <p>Enter the name of the pathogenic organism isolated in blood culture</p> <p>Select if pathogen was cultured from surface swab of vascular access site.</p> <p>Enter the name of the pathogenic organism isolated in surface swab of vascular access site</p>
<p>Antimicrobial Susceptibility</p>	<p>If pathogen was <i>Coagulase negative staph.</i>, <i>Enterococcus faecalis</i>, <i>Enterococcus faecium</i>, <i>Staphylococcus aureus</i>, <i>Acinetobacter spp.</i>, <i>Enterobacter spp.</i>, <i>E. coli</i>, <i>K. oxytoca</i>, <i>K. pneumonia</i>, <i>P. aeruginosa</i>, <i>S. marcescens</i> or <i>S. maltophilia</i> enter antimicrobial susceptibility according to the picklist. For each antibiotic listed enter the susceptibility – sensitive, resistant, intermediate or unknown.</p> <p>If pathogen is not listed antimicrobial susceptibility is not required.</p>

HAEMODIALYSIS EVENT (DENOMINATOR)

If you have any queries regarding the completion of this form please contact VICNISS

THIS DATA MUST BE SUBMITTED ELECTRONICALLY USING A VICNISS WEBFORM

Record the number of haemodialysis outpatients who received haemodialysis at your centre on the first two working days of the month. Count each patient only once. If a patient has both an implanted access (graft or fistula) and a central line, count the patient as having the central line.

Hospital Code Number:

Month

For Month of:	Year: 20_____
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Denominator Details

Vascular Access Type	Number of Haemodialysis Outpatients
Arteriovenous Fistula	
Arteriovenous Graft	
Tunneled Central Line	
Nontunneled Central Line	
Total Patients (sum of all patients listed above)	

HAEMODIALYSIS EVENT (NUMERATOR)

If you have any queries regarding the completion of this form please contact VICNISS
THIS DATA MUST BE SUBMITTED ELECTRONICALLY USING A VICNISS WEBFORM

Hospital Code Number:

Patient Identification <i>(Do not attach a bradma label)</i>		
MRN (UR No.):	Sex: M <input type="checkbox"/> F <input type="checkbox"/>	DOB: / /

Vascular Access <i>(select all that apply)</i>	
1. <input type="checkbox"/> Arteriovenous Fistula - Access technique: <input type="checkbox"/> Buttonhole <i>or</i> <input type="checkbox"/> Rope-ladder	
2. <input type="checkbox"/> Arteriovenous Graft - Access technique: <input type="checkbox"/> Buttonhole <i>or</i> <input type="checkbox"/> Rope-ladder	
3. <input type="checkbox"/> Tunneled Central Line - Date of insertion: / / 20__ <i>or</i> <input type="checkbox"/> Date not available	
4. <input type="checkbox"/> Nontunneled Central Line - Date of insertion: / / 20__ <i>or</i> <input type="checkbox"/> Date not available	

Event Details	Date of Event: / / 20__
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Event Type: <i>(select all that apply)</i>	
<input type="checkbox"/> IV antimicrobial start	Was IV Vancomycin started? <input type="checkbox"/> Yes <input type="checkbox"/> No
<input type="checkbox"/> Positive blood culture (complete pathogen & antimicrobial susceptibility below)	
What was the suspected source of the positive blood culture?	
<input type="checkbox"/> Vascular access <input type="checkbox"/> Source other than vascular access <input type="checkbox"/> Contamination <input type="checkbox"/> Uncertain	
<input type="checkbox"/> Pus, redness, or increased swelling at vascular access site	
Which vascular site was affected?	
<input type="checkbox"/> Arteriovenous fistula <input type="checkbox"/> Arteriovenous graft <input type="checkbox"/> Tunneled catheter <input type="checkbox"/> Nontunneled catheter	
Was a surface swab collected? <input type="checkbox"/> Yes <input type="checkbox"/> No	
If Yes, was an organism identified? <input type="checkbox"/> Yes <input type="checkbox"/> No (If Yes, complete pathogen & antimicrobial susceptibility below)	

Problems Related to Event: <i>(select all that are present)</i>	
<input type="checkbox"/> Fever ≥ 37.8°C oral	<input type="checkbox"/> Pneumonia or respiratory infection
<input type="checkbox"/> Chills or rigors	<input type="checkbox"/> Urine culture with >100,000 organisms/ml with not more than 2 species isolated
<input type="checkbox"/> Abnormal drop in blood pressure	<input type="checkbox"/> Endocarditis (proven or suspected)
<input type="checkbox"/> Wound (NOT related to vascular access) with pus or increased redness	<input type="checkbox"/> Other (specify) _____
<input type="checkbox"/> Cellulitis (skin redness, heat, or pain without open wound)	<input type="checkbox"/> Nil

Outcome <i>(related to the event):</i>	Hospitalisation: <input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Unknown	Death: <input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Unknown
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Pathogen & Antimicrobial Susceptibility

Site of Pathogen: <input type="checkbox"/> Blood culture	Name of Pathogen: <small>(If listed below, complete antimicrobial susceptibility)</small>
Site of Pathogen: <input type="checkbox"/> Surface swab	Name of Pathogen: <small>(If listed below, complete antimicrobial susceptibility)</small>

	Vancomycin				Fusidic Acid				Penicillin				Ampicillin				Methicillin**				Rifampicin			
	S	R	I	U	S	R	I	U	S	R	I	U	S	R	I	U	S	R	I	U	S	R	I	U
Gram positives (Tick: S, R, I or U*)																								
<i>Coagulase negative staph.</i>																								
<i>Enterococcus faecalis</i>																								
<i>Enterococcus faecium</i>																								
<i>Staphylococcus aureus</i>																								

	Gram negatives (Record: S, R, I or U*)											
	Ceftazidime	Ceftriaxone	Cefepime	Imipenem / Meropenem	Piperacillin	Ampicillin	Gentamicin	Amikacin	Ciprofloxacin	Sufamethoxazole	Trimethin	
<i>Acinetobacter spp.</i>												
<i>Enterobacter spp.</i>												
<i>E. coli</i>												
<i>K. oxytoca</i>												
<i>K. pneumoniae</i>												
<i>P. aeruginosa</i>												
<i>S. marcescens</i>												
<i>S. maltophilia</i>												

*Antimicrobial Susceptibility: S=Sensitive; R=Resistant; I=Intermediate; U=Unknown.

**Methicillin is equivalent to Oxycillin or Flucloxacillin