Dialysis Event (DE)

Introduction:
In 2008, >350,000 patients were being treated with maintenance hemodialysis in the United States.[1] Hemodialysis 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. Bloodstream infectious and localized infections of the vascular access site are common in hemodialysis patients.[2-7] 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. Other access devices, such as catheter-graft hybrid devices, also exist. Because of frequent hospitalizations and receipt of antimicrobial drugs, hemodialysis patients are at high risk for infection with antimicrobial-resistant bacteria.

Settings:
Surveillance will occur in outpatient hemodialysis centers. These centers may be attached to or affiliated with a hospital, but should serve hemodialysis outpatients.

Population: The population for Dialysis Event surveillance is hemodialysis outpatients.

Requirements:
A minimum of 6 months of Dialysis Event (DE) **s**urveillance among hemodialysis patients receiving treatment at an outpatient hemodialysis facility, as indicated in the *Patient Safety Monthly Reporting Plan* (CDC 57.106). Monthly report of patient census information for the first 2 working days of each month, as indicated in the *Denominators for Outpatient Dialysis* form (CDC 57.119). Annual completion of the *Outpatient Dialysis Center Practices Survey* (CDC 57.104).

Definitions:
IV antimicrobial start: Include **all** outpatient IV antimicrobial starts, not just IV vancomycin starts and not just starts 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. If IV antimicrobials are stopped for less than 21 days and then restarted, the second start is NOT considered a new dialysis event.

Positive blood culture: Include **all** positive blood cultures collected as an outpatient or collected within 1 calendar day after a 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 dialysis event. If positive blood

cultures occur less than 21 days apart, the second positive blood culture(s) is NOT considered a new dialysis 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 increased swelling at a vascular access site to be considered separate dialysis events. If an episode of pus, redness, or increased swelling at a vascular access site resolves and then recurs within 21 days, the recurrence is NOT considered a new dialysis event.

The following specific types of DEs are determined with a computer algorithm from reported data.

Local access site infection: Pus, redness, or swelling of the vascular access site and bloodstream infection was not present.

Access-related bloodstream infection: Blood culture positive with suspected source identified as the vascular access site or uncertain.

Vascular access infection: Either local access site infection or access-related bloodstream infection.

REPORTING INSTRUCTIONS:
Reporting multiple dialysis events for a single patient:
Dialysis Event surveillance definitions include IV antimicrobial start; positive blood culture; and pus, redness, or increased swelling at the vascular access site. 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 Dialysis Event definitions for the 21 day rule.

Suspected source of the positive blood culture:
When reporting a positive blood culture, indicating the suspected source of the positive blood culture is required.
Vascular access: Choose "Vascular access" if there is objective evidence of vascular access infection and the vascular access is thought to be the source of the positive blood culture.
A source other than the vascular access: Choose "A source other than the vascular access" 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 the site is thought to be the source of the positive blood culture

b) there is clinical evidence of infection at another site which is thought to be the source of the positive blood culture, but the site was not sampled for culture

Contamination: Choose "Contamination" if the organism isolated from the blood culture is thought by the physician, infection preventionist, or head nurse 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 (*Corynebacterium* spp., not C. diphtheria)
  - *Bacillus* spp. (not *B. anthracis*)
  - *Propionibacterium* spp.
  - coagulase-negative staphylococci (including *S. epidermidis*)
  - viridans group streptococci
  - *Aerococcus* spp.
  - *Micrococcus* spp.

Uncertain: Choose "Uncertain" only if there is insufficient evidence to decide among the three previous suspected source categories.

Numerator Data:
For each patient with an IV antimicrobial start; positive blood culture; or pus, redness, or increased swelling at the vascular access site, participating dialysis centers will complete one *Dialysis Event* form (CDC 57.109) (see Definitions). The *Instructions for Completion of Dialysis Event* form (Patient Safety Component Manual, Chapter 14 Tables of Instructions, Tables 9 and 2a) includes brief instructions for collection and entry of each data element on the form.

Denominator Data:
The number of chronic hemodialysis patients with each access type who received hemodialysis at the center during the first two working days of the month is recorded on the *Denominators for Outpatient Dialysis Form* (CDC 57.119). These data are used to estimate the number of patient-months. Only hemodialysis 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. The *Instructions for Completion of Denominators for Outpatient Dialysis* (Patient Safety Component Manual, Tables of Instructions, Table 10) includes brief instructions for collection and entry of each data element on the form.

Data Analyses:
The numbers of various dialysis events are tabulated, and rates of these events per 100 patient-months are calculated by dividing the number of dialysis 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 pooled mean rate of all centers combined.

[1] U.S. Renal Data System, USRDS 2009 Annual Data Report: Atlas of End-Stage Renal Disease in the United States, National Institutes of Health, National Institute of Diabetes and Digestive and Kidney Diseases, Bethesda, MD, 2009. (http://www.usrds.org/adr.htm)

[2] Klevens RM, Edwards JR, Andrus ML, Peterson KD, Dudeck 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 JI, 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 bactermia in hemodialysis outpatients. Abstract presented at the Society for Healthcare Epidemiology of America, Salt Lake City, UT, April 2002.