Nationales Referenzzentrum
für Surveillance von
nosokomialen Infektionen

Krankenhaus-Infektions-
Surveillance-System

Surveillance of Dialysis-Associated Infection Events in Outpatient Dialysis Facilities

(AMDI-KISS)

at the

Institute of Hygiene and Environmental Medicine
Charité – Universitätsmedizin Berlin

Internet: https://www.nrz-hygiene.de/

Protocol version: April 2024

Start of validity: April 2024

Translation: April 2025

Note on translation

This document provides an English translation of the German version of the protocol on the surveillance of dialysis-associated infection events of AMDI-KISS. Only minor content-related changes were made to increase clarity for international readers. Certain terms were adapted to align with the terminology of the US Centers for Disease Control and Prevention and the European Centre for Disease Prevention and Control. Where applicable, administrative information was updated. The translation was aided by DeepL Pro, 2024.

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1. Introduction

AMDI-KISS stands for "**Am**bulante **Di**alyse" (Outpatient Dialysis) and enables facility-based surveillance of infection data in outpatient dialysis facilities.

AMDI-KISS

AMDI-KISS is a module of the *Krankenhaus-Infektion-Surveillance-System* (KISS; Hospital Infection Surveillance System). KISS is operated by the *Nationalen Referenzzentrum für Surveillance von nosokomialen Infektionen* (NRZ). Since the beginning of 1997, hospitals and outpatient facilities throughout Germany that voluntarily participate in KISS have been recording nosocomial infections in risk populations and generating reference data.

AMDI-KISS was initiated to enable outpatient dialysis facilities to monitor facility-related dialysis-associated infection events. The method was previously implemented and tested in a large cluster-randomized intervention study - the DIPS study. The results of the DIPS study were published in 2023 (Weikert et al. 2023, Journal of Hospital Infection 142 (2023) 67-73. https://doi.org/10.1016/j.jhin.2023.08.024).

2. Objectives of the surveillance protocol

The surveillance protocol provides definitions and specifications required for uniform and standardised data collection and data analysis of the dialysis-associated infection event data.

This surveillance protocol incorporates definitions and specifications from the *National Healthcare Safety Network* (NHSN, formerly NNIS) of the *Centers for Disease Control and Prevention* (CDC) (https://www.cdc.gov/dialysis/).

3. Requirements for the participation of outpatient dialysis facilities in infection surveillance in AMDI-KISS and obligations of the institutions supporting KISS

Participating outpatient dialysis facilities must fulfil the following requirements:

- Consent of the chief physicians responsible for the facility to participate in the project,
- Appointment of a person responsible for surveillance (e.g. a link nurse or an IPC-specialist),
- Completion of an introductory course at the NRZ,
- Approval of the use of the KISS definitions for the diagnosis of dialysis-associated infection events and publicising these definitions to the treating physicians,
- Strict application of the mandatory provisions of the surveillance protocol in AMDI-KISS in its current version (in addition to the recommended data, the facilities can of course record further data if they are relevant for the facility's quality management),
- Data collection and transmission via a data management system (webKess) provided by the NRZ (see 4.1),
- Willingness to report descriptive parameters (structural and process parameters of the facility, e.g. size of the facility etc.),
- Willingness to carry out internal quality assurance measures in the event of corresponding surveillance results,
- Participation in regular KISS events organized by the NRZ (exchange of experience),
- Willingness to participate in validation measures.

The institutions supporting the KISS assure the facilities,

- to advise and support them professionally in the implementation of surveillance,
- to handle the data of the individual organizations with strict confidentiality,
- to enable the participating outpatient dialysis facilities to analyse the data,
- advise them on the implementation of the surveillance results for quality management.

4. Definitions and specifications for the documentation

4.1 Electronic recording of survey data

KISS provides AMDI-KISS participants with an electronic system for entering, managing and analysing survey data. The webKess programme is used for this purpose. You can reach webKess at the following Internet address: www.webkess.de

webKess enables the documentation of the infection data. Furthermore, each participant can analyse the infection data independently at any time.

In order to ensure that the reference data calculation considers the latest data, KISS participants are obliged to complete the survey data for the previous year up to 6 weeks after the end of a calendar year. If webKess is temporarily unavailable due to technical problems, the data entry forms contained in this protocol should be used for documentation during this period. Data initially documented on paper forms must then be subsequently entered in webKess, as only data records transmitted electronically via webKess can be considered for the analyses.

4.2 Definitions of setting and population

Setting: AMDI-KISS is designed for **outpatient dialysis facilities**.

Population: **Outpatients or day-care patients** undergoing long-term hemodialysis who received at least one dialysis treatment at the participating outpatient dialysis facility during the surveillance period.

Inclusion criteria:

- Outpatients with hemodialysis
- Day care-patients with hemodialysis
- Outpatients or day care-patients with peritoneal dialysis who are receiving hemodialysis at the outpatient dialysis facility
- Transplanted patients who are receiving hemodialysis at the outpatient dialysis facility

Exclusion criteria:

- Inpatients who are receiving hemodialysis at the outpatient dialysis facility as part of a cooperation with hospitals/clinics and are currently receiving inpatient treatment
- Outpatients who are only receiving peritoneal dialysis at the outpatient dialysis facility

Observation period: All outpatients or day-care patients of the participating dialysis facility are observed for the presence of dialysis-associated infection events as part of infection surveillance for as long as they are cared for and treated in the participating dialysis facility. This means from the time the patient is admitted to the dialysis facility until he or she leaves the outpatient dialysis facility.

4.3 Definitions and specifications for Dialysis-associated Infection Events (DAIEs) (numerator data)

Dialysis-associated infection events (DAIE)

A dialysis-associated infection event (DAIE) is present if at least one of the following criteria is met in the patient case:

(1) Start of intravenous (IV) antibiotic therapy
(2) Positive blood culture
(3) Pus, redness, or increasing swelling at the vascular access site. (For CVCs, if the KAST classification ≥ 2 is fulfilled).

If several criteria are fulfilled for a single patient, the criteria should be reported on the same dialysis event form. The "date of event" is always the date of the criterion that was fulfilled first.

Example: A patient on outpatient hemodialysis shows redness and slight swelling at the vascular access site of the tunnelled vascular catheter (e.g. Demers-catheter) on 10/01/24 during the examination. On the following day, 11/01/24, the patient also develops a fever. Blood cultures are taken, which reveal the presence of *Staphylococcus aureus*. Two criteria are therefore recorded with a date:

1) redness, pus and/or increasing swelling at the vascular access on 10/01/2014 and
2) positive pathogen detection in the blood culture on 11/01/2014 with evidence of *S. aureus*.

The "date of event" is therefore the 10/01/24.

21-day rule: To prevent dialysis-associated infection events in a single patient from being counted twice, a 21-day blocking period is applied. This means that there must be at least 21 days after the last infection date between two dialysis-associated infection events in a single patient. Do not report unrelated dialysis events on the same dialysis event form. Dialysis events are considered related if fewer than 21 days have passed since the last reported event in a single patient.

DAIE not to be counted: Newly acquired dialysis events should be recorded on a facility-specific basis. This means that a dialysis event is only assigned to the participating dialysis facility if the patient was not dialysed or treated as an inpatient in another facility (e.g. hospital, other dialysis facility, holiday dialysis in another facility) in the 7 days prior to the newly acquired dialysis event. If there was an inpatient stay in the last 7 days before dialysis event or if the patient was dialysed at least once in another facility, the dialysis event does not count as facility-related for infection surveillance and is not counted for the participating dialysis facility.

Details on the criteria for dialysis-associated infection events (DAIE):

1) **Start of intravenous (IV) antibiotic therapy:** All new prescriptions for intravenous antibiotics or antifungals in the outpatient setting are considered and counted as dialysis-associated infection events where a dialysis-associated focus of infection is assumed or the focus of infection is unknown. Antiviral therapies are not considered or counted. In addition, the corresponding start date of the intravenous antibiotic administration is added
   The following are not recorded: all intravenous antibiotics prescribed for the following clinical indications: 1) confirmed urinary tract infection 2) confirmed pneumonia or other respiratory tract infection or 3) infection with a confirmed focus that was not associated with dialysis (e.g. diabetic foot). In these cases, no record sheet is completed. Oral antibiotics are generally not considered and not recorded.

2) **Positive blood culture:** All positive pathogen detections in blood cultures that occurred on an outpatient basis or within one to two calendar days after hospital admission are counted. The two calendar days after hospital admission include all positive blood

cultures taken from participating outpatient dialysis facilities on the day of hospital admission and on the following calendar day.

Only positive pathogen detections in the blood culture whose origin is dialysis-associated are recorded. This means that a secondary focus of infection has been excluded by medical diagnosis. If the focus of infection is unknown or cannot be clearly diagnosed, the infection event is assessed and recorded as dialysis-associated.

3) **Redness, pus and/or increasing swelling at the vascular access site:** In every dialysis patient treated, the vascular access should be assessed for local signs of infection such as redness, pus and/or increasing swelling. One of the three criteria described below is sufficient to diagnose "local signs of infection":
   (1) Pus
   (2) Redness that clinically indicates an infection
   (3) Increasing swelling that goes beyond the expected swelling at the vascular access and clinically presents as swelling in the context of an infection.

Pus should always be recognized as a sign of a local infection and is therefore always recorded. In the case of CVCs, the KAST classification can be used in the assessment. In the case of a KAST classification $\geq$ 2, local signs of infection can be assumed by definition and this is recorded as a dialysis-associated infection event in the dialysis event form.

The date of the first symptoms must also be recorded. This can be requested from the patient. If this is not known, the determination date can be recorded as the date of the first symptoms. It is also recorded whether a wound swab was taken at the vascular access site and what the result was. All pathogens detected are listed as the result

Outcomes of a dialysis-associated infection event:

- **Loss of the vascular access**
- **Hospitalisation**
- **Death**

For the outcomes of a dialysis-associated infection event, the following three options "loss of the vascular access", "hospitalisation" and "death" should be recorded. Multiple answers are possible.

4.4 Definitions and specifications for the monthly hemodialysis performed (denominator data)

The denominator data recorded monthly (Monthly reporting form).

The number of hemodialysis sessions and the number of hemodialysis patients treated are recorded in the monthly questionnaire, stratified by type of vascular access (shunt, graft, tunnelled or non-tunnelled CVC). For patients with several simultaneous vascular accesses, the vascular access that was used for dialysis is counted. This means that if a patient has an AVF and a horizontal CVC and the dialysis treatment was carried out via the CVC, the patient is assigned to the group with a CVC. This means that only one access per patient is counted.

The monthly number of hemodialysis treatments is the sum of all hemodialysis treatments via AVF, prosthetic shunt and CVC that took place during the month. Dialysis treatments via other vascular accesses (e.g. port) are not counted.

For the monthly number of hemodialysis patients, the total number of hemodialysis patients treated via AVF, prosthetic shunt or CVC in the dialysis facility on the first two working days of each month is

used as an approximate value in order to achieve a balanced cost-benefit ratio. As hemodialysis patients are usually hemodialyzed two to three times a week, the number of patients treated during the month can be determined in this way with little effort.

At the end of the month, the totals of all hemodialysis/hemofiltration that have taken place for outpatients and day-care patients with hemodialysis are calculated and evaluated separately by access type (fistula, graft, CVC). As a result, the dialysis-associated infection events can be calculated separately for each access type in relation to the total number of hemodialysis treatments performed.

4.5 Definition and specifications for structural parameters (structural data)

As structural data, the number of dialysis treatment places is recorded numerically and the operating hours categorically per outpatient dialysis facility. For the operating hours, the following options are available: 5-day week, 6-day week, 7-day week or other.

Ideally, the structural and process parameters are specified by the link nurse or a doctor at the start of the surveillance and updated in the event of changes.

5. Implementation of surveillance

5.1 Data collection on site in the outpatient dialysis facilities

Surveillance of dialysis-associated infection events is carried out on a monthly basis: i.e. the events of a dialysis facility are summarised monthly by the person responsible for surveillance and entered electronically via webKess. The monthly denominator data is also recorded monthly and entered via webKess.

The workflow for recognizing and reporting dialysis-associated events is shown graphically in the followingFigure1 .

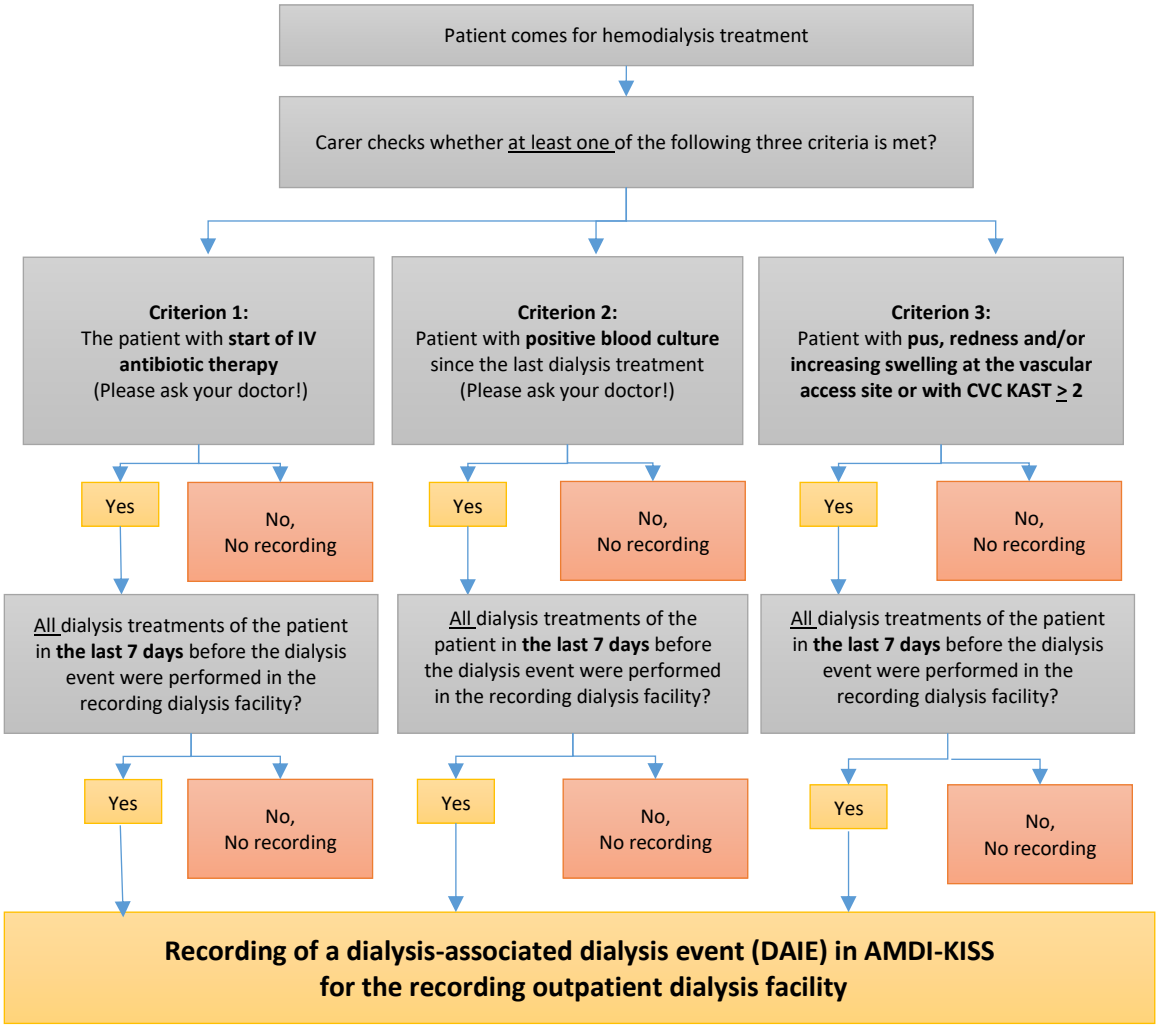

Figure1 : Procedure for recognizing and reporting dialysis-associated dialysis events (DAIE)

Table1 shows an example of the data collection process and the persons responsible for the individual work steps.

Table1 : Data collection process and persons responsible

Procedure	Responsible person	Implementation
Step 1	all nurses/doctors	Recognizing dialysis-associated dialysis events based on the criteria described above as part of patient care
Step 2	all nurses/doctors	Reporting suspected cases of dialysis-associated dialysis events to the dialysis facility's surveillance officer
Step 3	Link nurse or IPC-specialist	Check whether the definition of a DAIE is met and create a dialysis event form for the dialysis-associated dialysis event, including researching all the necessary information. Follow-up of the patient and completion of the documentation
Step 4	Link nurse or IPC-specialist	Entry of dialysis-associated dialysis events in webKess
Step 5	Link nurse or IPC-specialist	Monthly collection and entry of denominator data (e.g. number of dialysis treatments) in webKess

5.2 Data entry forms

A) Dialysis event form

Data entry form: see Appendix 1

Procedure for recording:

Observed dialysis-associated infection events are reported by the nurses in the dialysis facility to the person responsible for surveillance. This person creates a data entry form for the patient with an infection event with a consecutive patient number. As the DAIE documentation in webKess does not allow any conclusions to be drawn about the patient concerned, it is recommended that a pseudonymisation table be kept for any subsequent queries. The pseudonymisation table remains in the dialysis facility.

All required information in the data entry form is researched in the following days and the data entry form is supplemented over time. The data entry form for a dialysis-associated event in patients can be closed as soon as the 21-day blocking period after the last observed criterion for a dialysis-associated event has elapsed. The events can then be entered in webKess.
If webKess is temporarily unavailable due to technical problems, the completed forms should be temporarily filed away and added to webKess at a later date

B) Monthly reporting form

Data entry form: see Appendix 2

Procedure for recording:

The denominator data is summarised monthly from facility-related documentation systems (e.g. as an export from Nephro 7®). The data for the dialysis facility is entered into webkess on a monthly basis so that facility-related evaluations are possible.

C) Structural data form

Data entry form: see Appendix 3

Person completing and forwarding the form:
the surveillance officer of the facility

Procedure for recording:
The structural data includes the number of dialysis treatment places and the weekly operation of the individual dialysis facilities. This data is requested once at the beginning of the surveillance and, if necessary, several times during the course of the surveillance for updating.

5.3 Information in connection with dialysis-associated events

The following table is intended to help you fill in the form.

Dialysis-associated infection event form (AMDI-KISS)	
Patient Data	
webKess Patient number:	Every patient with a dialysis-associated infection event receives a patient number. This is assigned by the person recording the event and can be recorded in a pseudonymisation table together with the full name and year of birth for subsequent queries.
Details of the dialysis outpatient facility	
webKess dialysis outpatient facility number:	Enter the KISS code of your dialysis facility. The KISS code has 5 digits and is assigned by KISS when you register (e.g. TPNDA). If you do not know the KISS code, please contact KISS Support.
Patient data	
Patient gender	female (W) or male (M) or non-binary (Diverse)
Year of patient birth	Year of birth of the patient (as a four-digit year)
Patient status	Enter the patient status. Tick "Outpatient" if the patient is currently being dialysed as an outpatient and " day-care patient" if the patient is being dialysed as a day-care patient. Inpatients are not recorded.
Date of the dialysis-associated infection event (DAIE)	
Dialysis-associated infection event (DAIE) Event date:	Date of the dialysis-associated infection event: If several criteria for a dialysis-associated infection event (e.g. IV antibiotic therapy and positive pathogen detection in the blood culture), the date furthest back in time is selected for the dialysis-associated event. This means the date of the criterion that was fulfilled first. The date therefore corresponds to the date furthest back in time under the following criteria: (1) Start of intravenous (IV) antibiotic therapy (date of start of IV antibiotic therapy) (2) Positive pathogen detection in the blood culture (BK) (date of the blood sample of the first positive pathogen detection) (3) Pus, redness or increasing swelling at the vascular access (for CVC: KAST classification≥ 2) (date of first observed symptoms) The date of the dialysis-associated infection event with day, month and year is mandatory. If the date is not provided, the data entry form cannot be considered for surveillance purposes.

Dialysis-associated infection event form (AMDI-KISS)	
Type of event	
Type of dialysis-associated infection event *(Please select at least one criterion.)*	In this section, the three main criteria of dialysis-associated infection events are queried. The three main criteria are: (1) Start of IV antibiotic therapy (2) Positive blood culture (3) Pus, redness or increasing swelling at the vascular access (for CVC: KAST classification≥ 2) At least one of the three criteria should be selected and explained in more detail. However, all three criteria can also be fulfilled. If one criterion is met, the associated questions should also be answered, e.g. date. The date furthest back in time among the three main criteria determines the date of the dialysis-associated infection event.
Start of a intravenous (IV) antibiotic therapy	Select this criterion if IV antibiotic therapy has been or will be started on an outpatient basis. This is therefore either: • for a new outpatient prescription of IV antibiotic therapy in the facility • for a new outpatient prescription of IV antibiotic therapy with a doctor outside the facility who has been treating the since the last dialysis treatment at the facility. It is important to note that only new prescriptions for IV antibiotic therapies whose cause was assessed as dialysis-associated on the basis of a medical diagnosis. If the cause of the infection is not dialysis-associated, but is a dialysis-independent focus of infection (e.g. pneumonia, urinary tract infection, wound infection), the criterion is not considered to be fulfilled and the event is not recorded as a dialysis-associated infection event. Only intravenously administered antibiotic therapies are recorded. The active ingredient is irrelevant. Oral antibiotic therapies, on the other hand, are not recorded.
Date of IV antibiotic therapy:	Please enter the date of the start of IV antibiotic therapy, regardless of whether the start of IV antibiotic therapy was started in the facility or by an attending physician outside the facility. The date must include the day, month and year.
Positive blood culture	Select this criterion if the patient is currently undergoing dialysis treatment with a new positive blood culture. It does not matter which pathogen is present or where the pathogen was detected. Contaminations should be excluded.
Date of the positive blood culture:	Enter the date of the first positive blood culture with day, month and year, regardless of the pathogen detected.

Dialysis-associated infection event form (AMDI-KISS)	
Organism detected in the blood culture: *(Please select the exact name from the drop-down menu; e.g. Staphylococcus aureus).*	Please select from the drop-down menu and enter the pathogen detected as accurately as possible according to the laboratory findings.
Pus, redness and/or Increasing swelling at the vascular access *(CVC: KAST classification ≥ 2)*	Please select this criterion if the patient currently shows local signs of infection such as pus, redness and/or swelling at the vascular access. In the case of a horizontal CVC, the KAST classification≥ 2 applies. For each patient, please assess whether there are local signs of infection at the vascular access.
Date of first symptoms:	Please enter the date of the first symptoms with day, month and year.
Was a wound swab taken?	Please indicate whether a wound swab was taken from the affected vascular access/dialysis access (answer options yes or no). Only tick "unknown" if it cannot be determined whether a wound swab was taken or not.
Organism detected in the wound swab: *(Please select the exact name from the drop-down menu; e.g. Staphylococcus aureus).*	Please select from the drop-down menu and enter the pathogen detected as accurately as possible according to the laboratory findings.
Access used for dialysis at the time of the event	
Vascular access *(Please select the vascular access to which the dialysis-associated infection event is assigned).* Type of vascular access Insertion of the CVC in the last 14 days	Please tick the box next to the type of vascular access to which the dialysis-associated infection event can be assigned in terms of time. As a rule, this is the vascular access that was used for hemodialysis before the infection event occurred. Please select only one vascular access. The following vascular accesses are queried: (1) Fistula (2) Graft (3) Tunnelled CVC (4) Non-tunnelled CVC Another type of vascular access (e.g. port) is not recorded. If you have a tunnelled or non-tunnelled CVC, you will also be asked whether the CVC was inserted in the 14 days prior to the occurrence of the infection event. Please indicate yes or no.
Outcomes	
Outcomes *(Please select all applicable outcomes. Multiple entries are possible).* Loss of the vascular access	Please tick if a vascular access was removed from the patient as a result of a dialysis-associated event. Only tick "unknown" if it cannot be determined whether the vascular access was removed or not.

Dialysis-associated infection event form (AMDI-KISS)	
Hospitalisation (inpatient admission) Death	Please tick if an inpatient admission was probably or definitely the result of or contributed to by a dialysis-associated event. Only tick "unknown" if it cannot be determined whether the patient was admitted as an inpatient or not. Please tick if the patient's death was probably or definitely the result of or contributed to by a dialysis-associated event. Only tick "unknown" if it cannot be determined whether the patient died or not. Please complete the information on all three outcomes (removal of vascular access, hospitalization, death) during the course of surveillance.
Remarks	Here you can make further notes on the dialysis-associated event or the patient.

6. Data analyses

The following rates are calculated to analyse the data:

6.1 Dialysis-associated bloodstream infections (BSI)

These are the most important rates for dialysis facilities to estimate infection frequencies and express the number of dialysis-associated nosocomial bloodstream infections per 1000 dialyses developed during the observation period.

1) Dialysis-associated bloodstream infection (laboratory confirmed) = Every *positive blood culture* (criterion 2) is to be classified as a catheter-associated bloodstream infection (BSI) as soon as another focus of infection is medically and diagnostically ruled out or unlikely. This means that there is a positive pathogen detection in blood cultures and the pathogen detected is not associated with an infection at a site other than dialysis (no contamination/no other focus of infection).

A distinction can be made between BSI with and without additional local signs of infection such as redness, pus and/or increasing swelling at the vascular access (criterion 3). In addition to the criterion of a positive blood culture, the criterion of IV antibiotic therapy (criterion 1)

2) IV antibiotic therapy = Every new *IV antibiotic administration* (criterion 1), but where no positive blood culture (criterion 2) was recorded. In this case, a secondary focus of infection must be medically and diagnostically ruled out or unlikely (e.g. pneumonia, urinary tract infection, wound infection).

Calculations:

1) Dialysis-associated bloodstream infections (BSI)		
Incidence rate for dialysis-associated BSI =	Number of BSI / Number of dialysis treatments	X 1000
Incidence density for dialysis-associated BSI =	Number of BSI / Number of patient months	X 100
Incidence rate for fistula-associated BSI =	Number of BSI in patients with fistula / Number of dialysis treatments with fistula	X 1000
Incidence density for fistula-associated BSI =	Number of BSI in patients with fistula / Number of patient months with fistula	X 100
Incidence rate for graft-associated BSI =	Number of BSI in patients with graft / Number of dialysis treatments with graft	X 1000
Incidence density for graft-associated BSI =	Number of BSI in patients with graft / Number of patient months with graft	X 100
Incidence rate for CVC-associated BSI =	Number of BSI in patients with CVC / Number of dialysis treatments with CVC	X 1000
Incidence density for CVC-associated BSI =	Number of BSI in patients with CVC / Number of patient months with CVC	X 100
Incidence rate for CVC (non-tunnelled)-associated BSI =	Number of BSI in patients with CVC (not tunnelled) / Number of dialysis treatments with CVC (non-tunnelled)	X 1000
Incidence density for CVC (non-tunnelled)-associated BSI =	Number of BSI in patients with CVC (not tunnelled) / Number of patient months with CVC (not tunnelled)	X 100
Incidence rate for ZVK (tunnelled)-associated BSI =	Number of BSI in patients with CVC (tunnelled) / Number of dialysis treatments with CVC (tunnelled)	X 1000
Incidence density for ZVK (tunnelled)-associated BSI =	Number of BSI in patients with CVC (tunnelled) / Number of patient months with CVC (tunnelled)	X 100
2) IV antibiotic therapy		
Incidence rate for IV antibiotic therapy =	Number IV antibiotic therapy / Number of dialysis treatments	X 1000
Incidence density for IV antibiotic therapy =	Number of IV antibiotic therapy Number of patient months	X 100
Incidence rate for IV antibiotic therapy for fistula =	Number IV antibiotic therapy in patients with fistula / Number of dialysis treatments with fistula	X 1000
Incidence density for	Number IV antibiotic therapy in patients with fistula	X 100

IV antibiotic therapy for fistula =	Number of patient months with fistula	
Incidence rate for IV antibiotic therapy for graft =	Number IV antibiotic therapy for patients with graft / Number of dialysis treatments with graft	X 1000
Incidence density for IV antibiotic therapy for graft =	Number IV antibiotic therapy for patients with graft / Number of patient months with graft	X 100
Incidence rate for IV antibiotic therapy for CVC =	Number IV antibiotic therapy for patients with CVC / Number of dialysis treatments with CVC	X 1000
Incidence density for IV antibiotic therapy for CVC =	Number IV antibiotic therapy for patients with CVC / Number of patient months with CVC	X 100
Incidence rate for IV antibiotic therapy for CVC (not tunnelled=	Number IV antibiotic therapy for patients with CVC (not tunnelled) / Number of dialysis treatments with CVC (non-tunnelled)	X 1000
Incidence density for IV antibiotic therapy for ZVK (not tunnelled) =	Number IV antibiotic therapy for patients with CVC (not tunnelled) / Number of patient months with CVC (not tunnelled)	X 100
Incidence rate for IV antibiotic therapy for ZVK (tunnelled) =	Number IV antibiotic therapy for patients with CVC (tunnelled) / Number of dialysis treatments with CVC (tunnelled)	X 1000
Incidence density for IV antibiotic therapy for ZVK (tunnelled) =	Number IV antibiotic therapy for patients with CVC (tunnelled) / Number of patient months with CVC (tunnelled)	X 100

6.2 Local infections at the vascular access (LASI)

Local infections at the vascular access = The calculation of the incidence rate and incidence density includes *local infections with signs of infection such as redness, pus and/or increasing swelling at the vascular access* (criterion 3), for which no positive blood culture (criterion 2) was recorded and for which no IV antibiotic administration (criterion 1) was not started.

Calculations:

Local infections at the vascular access		
Incidence of local infections	Number of local infections in patients on dialysis / Number of dialysis treatments	X 1000
Incidence density for local infections	Number of local infections in patients on dialysis / Number of patient months	X 100
Incidence for local infections with fistel	Number of local infections at the fistel / Number of dialysis treatments for patients with fistel	X 1000
Incidence density for local infections with fistel	Number of local infections at the fistel / Number of patient months with fistel	X 100
Incidence for local infections with a graft	Number of local infections at the graft / Number of dialysis treatments for patients with graft	X 1000
Incidence density for local infections with a graft	Number of local infections at the graft / Number of patient months with graft	X 100
Incidence for Local infections with CVC	Number of local infections at the CVC / Number of dialysis treatments for patients with CVC	X 1000
Incidence density for Local infections with CVC	Number of local infections at the CVC / Number of patient months with CVC	X 100
Incidence of local infections in CVCs (non-tunnelled)	Number of local infections at the CVC (not tunnelled) / Number of dialysis treatments for patients with CVC (non-tunnelled)	X 1000
Incidence density for local infections in CVCs (non-tunnelled)	Number of local infections at the CVC (not tunnelled) / Number of dialysis treatments for patients with CVC (non-tunnelled)	X 100
Incidence of local infections with CVC (tunnelled)	Number of local infections at the CVC (tunnelled) / Number of dialysis treatments for patients with CVC (tunnelled)	X 1000
Incidence density for local infections in CVCs (tunnelled)	Number of local infections at the CVC (tunnelled) / Number of dialysis treatments for patients with CVC (tunnelled)	X 100

7. Literature

Dialysis standard of the German Society of Nephrology in cooperation with the Association of German Kidney Centres and the Society of Paediatric Nephrology (GPN), first edition 2016, revised, updated version of 17.02.2022. https://www.dgfn.eu/dialyse-standard.html

Implementation of a new surveillance system for dialysis-associated infection events in outpatients dialysis facilities in Germany; B. Weikert, T.S. Kramer, F. Schwab, C. Graf-Allgeier, J-O. Clausmeyer, S.I. Wolke, P. Gastmeier, C. Geffers: Journal of Hospital Infection 142 (2023) 67-73. https://doi.org/10.1016/j.jhin.2023.08.024

8. Appendix

8.1 KAST classification

Simplified KAST classification (cited from the guideline for applied hygiene in dialysis, DGAHD e.V.; 3rd revised edition; 2013)

Classification	Definition of
0	• No signs of inflammation • Intact skin
1	• Moderate reddening (< 0.5 cm around the vascular access) • Dry crust • No secretion • Dry swab
2	• Significant reddening (> 0.5 cm around the vascular access) • No pain • Scanty, clear or yellowish secretion • No pus • Swab moistened with secretion
3	• Significant reddening (> 0.5 cm around the vascular access) • Clear secretion with scab • Abundant secretion on the swab • Possibly some fever
4	• Florid purulent inflammation around the vascular access • Danger of a tunnel infection

If an infection of the vascular access is suspected, a distinction must be made between mechanical irritation, colonization and a bacterial infection of the vascular access. The differentiation is made by means of a wound swab, combined with clinical signs (cited from the guideline for applied hygiene in dialysis, DGAHD e.V.; 3rd revised edition; 2013).

9. Attachments

Appendix 1 – Dialysis-associated infection event form

Appendix 2 - Monthly reporting form

Appendix 3 - Structural data form