KISS
Krankenhaus-Infektions-
Surveillance-System

ITS KISS

Protocol

Surveillance of nosocomial infections in intensive care units

on

Institute of Hygiene and Environmental Medicine
Charité - University Medicine Berlin

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1 Introduction

The KISS module ITS-KISS enables the surveillance of patients with multi-resistant pathogens and/or Clostridium difficile-associated diarrhoea (CDAD) and/or the surveillance of nosocomial infections in intensive care units.

This protocol "Surveillance of nosocomial infections" contains all specifications for the surveillance of nosocomial infections in intensive care units when participating in ITS-KISS.

The specifications for the surveillance of multi-resistant pathogens (MRE) and/or Clostridium difficile-associated diarrhoea (CDAD) are described in the protocol "Surveillance of patients with multi-resistant pathogens (MRE) and/or Clostridium difficile-associated diarrhoea (CDAD)", which is available on the NRZ website.

ITS-KISS module: Infection surveillance

Patients in intensive care units (ICUs) generally have an increased risk of acquiring nosocomial infections, as they frequently undergo invasive procedures and often have serious underlying illnesses.

Since the beginning of 1997, nosocomial infections have been recorded in the Hospital Infection Surveillance System (KISS) of the National Reference Centre (NRZ) for Surveillance of Nosocomial Infections by an increasing number of intensive care units throughout Germany that voluntarily participate in KISS.

Due to the importance of the frequency and severity of infections, infection recording in KISS in intensive care units focuses primarily on lower respiratory tract infections (pneumonia and bronchitis), septicaemia and urinary tract infections. If relevant for the ICU, surveillance* of ventricular drainage-associated meningitis/ventriculitis can also be optionally included in infection surveillance in ITS-KISS. The use of so-called devices (e.g. urinary tract catheters, central venous catheters, ECLS (ExtraCorporeal Life Support), invasive or non-invasive ventilation, external ventricular drainage) as risk factors for the development of nosocomial infections is also taken into account in the analysis.

The participating intensive care units transmit their data to the NRC. This enables the device application rates and device-associated infection rates to be analyzed for each intensive care unit.

= ongoing, systematic collection, analysis and interpretation of health data necessary for the planning, implementation and evaluation of medical interventions; this includes the up-to-date transmission of data to those who need this information (2)

In addition, the data from all intensive care units is summarized over the evaluation period and made available as reference data for comparison.

In addition, the rates are stratified according to the type of intensive care unit and thus the main underlying diseases of the patients in the various groups of intensive care units are included.

Since in this way significant predisposing and exposure risk factors of the patients are taken into account, differences between different intensive care units or time periods can provide an indication of infection problems, which should then be investigated in more detail.

If necessary, surveillance of other nosocomial infections can also be carried out in the intensive care unit.

2 Objectives of the surveillance protocol

The primary task of the surveillance protocol is to provide the necessary definitions and specifications for the hospitals participating in KISS. The aim is to standardize data collection and data analysis.

Secondly, other interested hospitals can also record according to these definitions and specifications and analyses their data analogously. This gives these hospitals the opportunity to orientate themselves on the reference data provided by the hospitals participating in the project.

The present KISS surveillance protocol also incorporates specifications and definitions of the *National Healthcare Safety Network* (NHSN, formerly NNIS) of the *Centers for Disease Control and Prevention* (CDC).

This surveillance protocol is aimed at interested hospital hygienists and hygiene nurses as well as clinicians who wish to carry out surveillance using the KISS method.

Any comments on further necessary specifications and explanations are very welcome.

3 Requirements for the participation of wards in infection surveillance in ITS-KISS and obligations of the institutions supporting KISS

The participating intensive care units must fulfil the following requirements:

- Consent of the chief physicians responsible for the intensive care unit to participate in the project
- Employment of full-time hygiene specialists in the hospital
  (The hygiene specialist is the most important contact person for the KISS and is responsible for the organization of surveillance in the hospital.
  The employment of a hospital hygienist is highly desirable, but not an absolute requirement)
- Completion of an introductory course at the NRZ
- Approval of the use of the KISS definitions for the diagnosis of nosocomial infections and publicising these definitions to the treating physicians.
- Strict application of the mandatory provisions of the surveillance protocol "Surveillance of nosocomial infections" in ITS-KISS in its current version (in addition to the recommended data, hospitals can of course record further data if they are important for the hospital's quality management).
- Surveillance of all three indicator infections (lower respiratory tract infection, primary bloodstream infection, urinary tract infection) regardless of their association with the device (e.g. also reporting of newly acquired pneumonia without association with ventilation).
- Data collection and transmission via a data management system (webKess) provided by the NRZ (see5.1).
- Willingness to report descriptive parameters (structural and process parameters of the ICU and the hospital, e.g. size of the hospital).
- Willingness to carry out internal quality assurance measures in the event of corresponding surveillance results.
- Participation in regular events organized by the NRZ (exchange of experience).
- Willingness to participate in validation measures.

The institutions supporting the KISS assure the hospitals,

- to advise and support them professionally in the implementation of surveillance,
- to handle the data of the individual stations with strict confidentiality,
- to enable the participating hospitals to analyses the data,
- advise them on the implementation of the surveillance results for quality management.

4 Methods for the surveillance of nosocomial infections

The methods proposed by KISS are primarily intended to support internal quality assurance measures.

Continuous intensive contact between the surveillance staff and the doctors, nurses and carers on the selected wards is therefore of great importance.
Also important for the identification of nosocomial infected patients are the regular review of laboratory results and the study of patient files on the wards. The fewer microbiological tests the hospital carries out, the more attention must be paid to the clinical symptoms of patients; regular participation in ward rounds and close contact with ward staff are suitable methods for this.

The existence of a newly acquired nosocomial infection in the intensive care unit is determined using the KISS definitions for nosocomial infections (at www.nrz-hygiene.de).

4.1 Method for intensive care units

Infection surveillance in ITS-KISS always includes the indicator infections **urinary tract infections**, **lower respiratory tract infections** (bronchitis and pneumonia) and **primary bloodstream infection**. These infections must always be documented in the event of acquisition in an intensive care unit participating in infection surveillance in ITS-KISS (first symptoms of infection on day 3 at the earliest in the intensive care unit), regardless of whether the infections are related to the use of devices or not. If one of these indicator infections is identified, the (temporal) association with specific devices must also be indicated. If a urinary tract infection is diagnosed, the association with an indwelling transurethral catheter must be checked; in the case of lower respiratory tract infections, the association with previous invasive ventilation must be checked; and if primary bloodstream infection occurs, the association with a central vascular catheter or ECLS (in the case of surveillance for ECLS as a device) must be specified. Intensive care units participating in infection surveillance in ITS-KISS can optionally extend surveillance for lower respiratory tract infections to include non-invasive ventilation as a further device ("non-invasive ventilation" surveillance component) and/or additionally record ventricular drainage (VD)-associated meningitis/ventriculitis as a further type of infection ("VD-associated meningitis" surveillance component).

In addition, surveillance for other nosocomial infections (e.g. infected decubital ulcers, L3, etc.) can also be carried out for internal quality management. The infection frequencies of these other infections in the ward are specified as incidence density. For these other infections and the non-device-associated indicator infections, however, the KISS does not provide any reference data for comparisons with other wards due to a lack of suitable standardization procedures.

Overview of the infections and devices under surveillance in ITS-KISS:

Type of infection	**Carrying out surveillance for the infection (even without reference to a device)**	**To be checked Device association**
Urinary tract infections	**Yes** (mandatory in ITS-KISS)	**Association with transurethral urinary catheters** (mandatory in ITS-KISS)
Infections of the lower respiratory tract (bronchitis and pneumonia)	**Yes** (mandatory in ITS-KISS)	**Association with invasive ventilation** (mandatory in ITS-KISS)
		Optional: for non-invasive ventilation
Primary bloodstream infection	**Yes** (mandatory in ITS-KISS)	**Association with CVC** (mandatory in ITS-KISS)
		Optional: Association with ECLS
Meningitis/ ventriculitis	Optional	Optional: association with external ventricular drainage
Other types of infection	Optional	Not possible

4.2 Implementation of the surveillance

Surveillance is carried out on a monthly basis (i.e. the infections and denominator data of a ward are summarized per month).

- To identify nosocomial infections in ICU patients, all patients admitted to the ICU on the first day of the month and all new patients admitted during the month are monitored for the occurrence of nosocomial infections.
- A nosocomial infection must have been acquired in the ICU in order to be categorized as an infection for the ward, i.e. the earliest date of infection is day 3 in the ICU.
- If one of the following nosocomial infections occurs
  - Urinary tract infections
  - Infections of the lower respiratory tract (bronchitis and pneumonia)
  - Primary bloodstream infection
  - Meningitis/ventriculitis (if selected by the ITS as a surveillance component)

  the association of the infection with the device to be assessed as a risk factor must be checked and specified when documenting the infection.

Definition of the device association of an infection

The definition of an association of infections in ITS-KISS with a device requires the use of the device over a defined minimum period of time prior to the infection.

The device association is defined by the temporal reference of the infection date to the day with a device and a minimum retention period of the device.

<u>Definition of</u>

A device association is present,

if on the day of infection (= first symptoms)

or the day before the day of infection

the device is/was present for at least the 3rd day.

Especially applies:

A urinary tract infection is associated with a urinary catheter if a transurethral urinary catheter was in place for at least the 3rd day on the day with the first symptoms of the infection (= day of infection) or the day before.

Bronchitis/pneumonia is associated with invasive ventilation (INV-associated) if invasive ventilation has taken place for at least the 3rd day on the day with the first symptoms of the infection (= day of infection) or on the day before.

Primary bloodstream infection is associated with a CVC if a CVC was present for at least the 3rd day on the day with the first symptoms of infection (=day of infection) or the day before, but does not meet the definition of an ECLS association.

Primary bloodstream infection is associated with ECLS if vascular access for ECLS procedures was available for at least the 3rd day on the day with the first symptoms of infection (=day of infection) or the day before.

Bronchitis/pneumonia is non-invasive ventilation-associated (NIV-associated) if non-invasive ventilation has taken place for at least the 3rd day on the day with the first symptoms of the infection (= day of infection) or the day before.

Ventricular drainage (VD)-associated meningitis/ventriculitis is present if an external ventricular drainage was in place for at least the 3rd day on the day with the first symptoms of infection (=day of infection) or the day before.

In addition to the documentation of nosocomial infections and their possible association with a device, further data is required for standardization and rate formation:

The following data is recorded daily and entered in the **monthly sheet for intensive care units** (see7.1).

We recommend using the midnight statistics:

Mandatory recording within infection surveillance in ITS-KISS:

1. Number of all new patients admitted to the ward. (For this purpose, all patients admitted to the ward in the last 24 hours are counted, including those who are no longer present at the time of counting and those who have only been on the ICU for a few hours)
2. Number of patients on this day (at a certain time of day, e.g. midnight)
3. Number of patients with transurethral urinary catheters (UTI) at midnight
4. Number of patients with central vascular catheters (CVC) (only one CVC per patient is counted for patients with several CVCs present at the same time) at midnight
5. Number of patients with invasive mechanical ventilation via tube/tracheostoma (INV) at midnight

If the surveillance components "non-invasive ventilation" and/or "ECLS" and/or "VD-associated meningitis" are selected, data is also optionally recorded:

6. Number of patients with mechanical non-invasive ventilation (NIV) for at least 6 hours within the last 24 hours
   (If both the definitions for non-invasive ventilation and invasive ventilation via tube/tracheostomy (INV) apply to the same patient on the same day, INV counts for recording in KISS)
7. Number of patients with external ventricular drainage (VD)
8. Number of patients with vascular access for extracorporeal oxygenation and/or decarboxylation of the blood (ECLS (e.g. ECMO, ECLA))

Example
One ward has 8 beds. At midnight on 10 June, there were 7 patients on the ITS. During the course of 11 June, five of these patients were transferred and four new patients were admitted to the ward. One of the new patients had a central venous catheterization and was ventilated for another two hours; he was transferred back to a peripheral ward in the course of the evening after about 8 hours.

At midnight, the data for the monthly list for 11 June will be determined as follows

- Number of **newly admitted patients** (within the last 24 hours): 4
- **Number of patients** (=at midnight): 5
- Patients with **HWK** (= of the 5 patients present at midnight all 5 have a HWK at midnight, the HWK of the already again discharged patients is NOT included): 5
- Patients with **CVC** (= of the 5 patients present at midnight 4 have a ZVK at midnight, the ZVK of the already again discharged patients is NOT included): 4
- Patients with **ventilation** (= of the 5 patients present at midnight 2 patients are ventilated at midnight, the ventilation of the already patients discharged again is NOT included): 2

At the end of the month, the totals of all five (or six, seven or eight) columns are calculated to determine the number of newly admitted patients during the month, the total number of all patient days, all HWC days, all CVC days, all INV days and, if surveillance is also carried out on the ICU, all NIV days, VD days and ECLS days. If a patient develops a nosocomial infection in the intensive care unit, further data is collected (see7.3).

The following rates are calculated to analyze the data:

- **Device application rates**

They describe the percentage of patient days on which a specific device was present and are calculated as the quotient of the number of device days and the total number of patient days on a ward, multiplied by 100.

Always be calculated:

HWK application rate

$$= \frac{\text{Number of HWK days}}{\text{Number of patient days}} \times 100$$

ZVK application rate

$$= \frac{\text{Number of ZVK days}}{\text{Number of patient days}} \times 100$$

INV application rate for ventilation via tube/tracheostoma

$$= \frac{\text{Number of ventilation days via tube/tracheostoma}}{\text{Number of patient days}} \times 100$$

If selected as optional surveillance components within the infection surveillance in ITS-KISS by the surveillance personnel, an additional charge will be made:

NIV application rate for non-invasive ventilation

$$= \frac{\text{Number of days with non-invasive ventilation}}{\text{Number of patient days}} \times 100$$

VD application rate for the external ventricular drains

$$= \frac{\text{Number of days with ventricular drainage}}{\text{Number of patient days}} \times 100$$

ECLS application rate for the procedures for extracorporeal oxygenation and/or decarboxylation of the blood

$$= \frac{\text{Number of days with ECLS}}{\text{Number of patient days}} \times 100$$

- **Device-associated infection rates**

They are the most important rates for intensive care units to estimate infection frequencies and express the number of device-associated nosocomial infections developed per 1000 device days during the observation period.

HWK-associated urinary tract infection rate

$$= \frac{\text{Number of urinary tract infections in patients with UTIs}}{\text{Number of UTI days}} \times 1000$$

CVC-associated primary bloodstream infection (BSI) rate

$$= \frac{\text{Number of primary BSI cases in patients with CVC}}{\text{Number of CVC days}} \times 1000$$

ECLS-associated primary bloodstream infection (BSI) rate

$$= \frac{\text{Number of primary BSI cases in patients with ECLS}}{\text{Number of ECLS days}} \times 1000$$

INV associated respiratory infection rate

$$= \frac{\text{Number of bronchitis and pneumonia cases in invasively ventilated patients via tube/tracheostoma}}{\text{Number of ventilation days via tube/tracheostoma}} \times 1000$$

INV-associated pneumonia rate

$$= \frac{\text{Number of pneumonias in invasive over Tube/tracheostoma ventilated patients}}{\text{Number of ventilation days via tube/tracheostoma}} \times 1000$$

INV-associated bronchitis rate

$$= \frac{\text{Number of bronchitis cases with invasive over Tube/tracheostoma ventilated patients}}{\text{Number of ventilation days via tube/tracheostoma}} \times 1000$$

If selected as optional surveillance components within the infection surveillance in ITS-KISS by the surveillance personnel, an additional charge will be made:

NIV-associated respiratory infection rate

$$= \frac{\text{Number of bronchitis and pneumonia cases for patients with non-invasive ventilation}}{\text{Number of NIV days}} \times 1000$$

NIV-associated pneumonia

Number of pneumonias in patients with non-invasive ventilation

$$\text{rate} = \frac{\text{Number of NIV-associated pneumonia cases}}{\text{Number of NIV days}} \times 1000$$

$$\text{NIV-associated bronchitis rate} = \frac{\text{Number of bronchitis cases in patients with non-invasive ventilation}}{\text{Number of NIV days}} \times 1000$$

$$\text{VD-associated meningitis rate} = \frac{\text{Number of meningitis/ventriculitis cases in patients with external ventricular drainage}}{\text{Number of VD days}} \times 1000$$

- **Incidence density of nosocomial indicator infections (sum of device-associated and non-device-associated) and other nosocomial infections**

The incidence density indicates the frequency of nosocomial infections in relation to 1000 patient days and is therefore an estimate of the probability of patients contracting a new nosocomial infection during their inpatient stay. The most important risk factors (devices) are not taken into account here. Therefore, incidence densities are not sufficiently suitable for comparisons with other wards, but should rather show trends on one's own ward over time or allow an indication of how often a nosocomial infection occurs on one's own ward per 1000 patient days.

Incidence density "Other infections"

$$= \frac{\text{Number of other nosocomial infections}}{\text{Number of patient days}} \times 1000$$

Incidence density of urinary tract infections

$$= \frac{\text{Number of all (device and non-device-associated) urinary tract infections}}{\text{Number of patient days}} \times 1000$$

Incidence density of primary bloodstream infection (BSI)

$$= \frac{\text{Number of all (device and non-device-associated) primary BSI cases}}{\text{Number of patient days}} \times 1000$$

Incidence density of respiratory tract infections

$$= \frac{\text{Number of all (device and non-device-associated) Respiratory tract infections}}{\text{Number of patient days}} \times 1000$$

Incidence density of meningitis

$$= \frac{\text{Number of all (device and non-device-associated) Meningitis}}{\text{Number of patient days}} \times 1000$$

Calculation of an example:

In addition to the three indicator infections, the surveillance components "ECLS-associated bloodstream infection (BSI) " and "VD-associated meningitis" are selected on the sample ward. The other nosocomial infections are also recorded.

Given:

Number of urinary tract infections		of which HWK-associated	2
Number of primary BSI cases	2	of which CVC-associated	
		of which ECLS-associated	1
Number of pneumonias	1	of which INV-associated	1
Number of bronchitis	2	of which INV-associated	
Number of meningitis	1	of which VD-associated	1
Number Other infections	1	(one arterial or venous infection (F1))	

and the data from the sample monthly sheet (see)7.2

Wanted: all described instalments

Invoice:

- Device rates

		for interpretation:
HWK application rate	=(216/240) x 100 = 90	90 HWK days per 100 patient days
ZVK application rate	=(200/240) x 100 = 83	83 CVC days per 100 patient days
INV application rate	=(80/240) x 100 = 33	33 INV days per 100 patient days

Optional when selecting the "ECLS" and/or "VD-associated meningitis" surveillance component

ECLS application rate	=(40/240) x 100 = 17	17 ECLS days per 100 patient days
VD application rate	=(30/240) x 100 = 12,5	12.5 VD days per 100 patient days

- Device-associated infection rates

HWK-associated urinary tract infection rate	=(2/216) x 1000 = 9,2	9.2 HWK-associated HWI per 1000 HWK days
CVC-associated primary bloodstream infection (BSI) rate	=(1/200) x 1000 = 5,0	5 CVC-associated BSI per 1000 CVC days
INV-associated respiratory infection rate	=(2/ 80) x 1000 = 25	25 INV-associated respiratory tract infections per 1000 invasive ventilation days
INV-associated pneumonia rate	=(1/ 80) x 1000 = 12,5	12.5 INV-associated pneumonias per 1000 invasive ventilation days
INV-associated bronchitis rate	=(1/ 80) x 1000 = 12,5	12.5 INV-associated bronchitis per 1000 invasive ventilation days

Optional when selecting the surveillance component "ECLS"

ECLS-associated bloodstream infection (BSI) rate	=(1/40) x 1000 = 25	25 ECLS-associated BSI cases per 1000 ECLS days

Optional if the "VD-associated meningitis" surveillance component is selected:

VD-associated meningitis rate	=(1/30) x 1000 = 33,3	33.3 VD-associated menigitides per 1000 VD days

- Incidence density

Incidence density of other infections	=(1/240) x 1000 = 4,2	4.2 other infections per 1000 patient days
Incidence density of respiratory tract infections	=(3/240) x 1000 = 12,5	12.5 respiratory tract infections per 1000 patient days
Incidence density of urinary tract infections	=(3/240) x 1000 = 12,5	12.5 urinary tract infections per 1000 patient days
Incidence density of meningitis	=(1/240) x 1000 = 4,2	4.2 meningitis per 1000 patient days
Incidence density of bloodstream infection (BSI)	=(2/240) x 1000 = 8,4	8.4 BSI cases per 1000 patient days

4.3 Comparison of infection rates

- An evaluation of the device application rates, the device-associated infection rates and the incidence densities can be created for the participating intensive care units.
- In addition, the rates of all intensive care units (excluding incidence densities) are summarized over the entire period and provided as reference data for comparison. The pooled arithmetic mean as well as the 25% quantile, the median and the 75% quantile are given for the device application rates and the infection rates. (The 25% quantile is the value below which 25% of the ICUs lie with their application and infection rates. Correspondingly, the median and the 75% quantile represent the values at which 50% and 75% of the ICUs, respectively, are below these values).

In addition to the standardization carried out, the rates are stratified according to the type of intensive care unit and thus the main underlying diseases of the patients in the various groups of intensive care units are taken into account.

If the main predisposing and exposure risk factors of patients are taken into account in this way, differences between different hospitals or time periods may provide an indication of infection problems, which should then be investigated in more detail.

5 Specifications for the documentation

5.1 Electronic recording of survey data

The NRZ provides KISS participants with an electronic system for recording surveillance data.

The online platform webKess is used for the internal data management of KISS participants and the exchange of data between KISS participants and NRZ.

You can reach webKess at the Internet address: www.webkess.de.

webKess enables the recording of the station's monitoring data. Furthermore, each participant can create station-related analyses independently at any time.

In order to ensure that the reference data calculation takes into account 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. This data must then be subsequently entered in webKess.

5.2 Surveillance plan: Surveillance targets and components

In the electronic data management system for ITS-KISS (webKess), it is necessary to make settings for the periods with surveillance and the scope of surveillance. The calendar months with surveillance and the surveillance components to be included must be defined. Surveillance breaks can also be defined on a monthly basis.

These specifications are referred to as the surveillance plan. In this plan, the ITS-KISS participant specifies at the beginning of a new calendar year in which months of the year which surveillance is to take place. The following specifications must be made when carrying out "Surveillance of nosocomial infections" in ITS-KISS:

- Surveillance goal: surveillance
- If infection surveillance is selected for at least one month: optional surveillance components
- Surveillance break

The surveillance plan has an impact on your own evaluation, the selection of data for reference data generation and possibly for the acquisition of a certificate. Further information on KISS certificates can be found on the NRZ website.

5.3 Recording infections in intensive care units in ITS-KISS

If a patient develops a nosocomial infection according to KISS definitions during their stay in the intensive care unit, certain data on this infection must be recorded.

Infections should be recorded by the hygiene specialist or other persons trained in the use of the KISS definitions.

(Examples of data entry forms are shown in the appendix)

KISS participants enter the data into a recording system (webKess) provided by the NRZ (see)5.1

The following information is required:

Master data	
Hospital	The hospital abbreviation is assigned by the NRZ.
Station	The station abbreviation is assigned by the NRZ.
Type of intensive care unit	In webKess, you can choose from various intensive care unit types. The assignment is not based on the speciality that manages the ICU, but should correspond to the majority of patients treated. Select "*surgical"* for predominantly surgical patients (even if they come from different specialities, e.g. gynaecology, ENT and general surgery). Select "*medical"* for predominantly conservative patients. If the proportion of patients treated conservatively and surgically is approximately the same, select "*interdisciplinary*". Select *neurosurgical, paediatric* or another of the specified selection options accordingly. A new addition is the ITS type *burns*. ICUs that do not fit into the predefined scheme select "*other"*.
Infection data	
Recording date	Day, month and year of the patient's admission to the ward
Gender	Enter female or male.
Year of birth	Year of birth of the patient.

Infection date	Day, month, year, of the date of infection. The date of infection is the day with the first (specific or non-specific) symptom. If the first symptom is a non-specific symptom (e.g. fever) and other causes for this symptom are present at the same time, then the date of infection is the day with the first specific sign/symptom for the infection. Specific symptoms for infections are • Results from a laboratory sample for the diagnosis of a pathogen (e.g. urine culture, blood culture, microbiological examination of tracheal secretions) • Results from imaging procedures (e.g. chest X-ray, CT, MRI, ultrasound) • Procedure or examination results • Diagnosis of the doctor • Start of AB therapy
Urinary tract infection (UTI)	D1= symptomatic UTI, D2= asymptomatic UTI with secondary bloodstream infection, D3= other urinary tract infections (selected according to the KISS definitions) with a bacterial pathogen (fungi and viruses are not accepted as pathogens for urinary tract infections in KISS).
Urinary catheter (HWK) (=HWK-associated)	(Only to be specified for patients with UTI) Tick if the definition of device association applies: A urinary tract infection is associated with a urinary tract catheter if a transurethral urinary tract catheter was in place for at least the 3rd day on the day with the first symptoms of infection (= day of infection) or the day before. This does not include intermittent catheterisations.
Lower respiratory tract infection	Pneumonia (C1a, C1b, C1c, C1d), bronchitis/tracheobronchitis/tracheitis (J1), other lower respiratory tract infection (J2) (selection according to KISS definitions)
Ventilation	(Only to be specified for patients with respiratory tract infections)
Invasive ventilation via tube or tracheostoma (=INV-associated)	Tick if the definition of the device association applies: Bronchitis/pneumonia is associated with invasive ventilation (INV-associated) if invasive ventilation took place for at least the 3rd day on the day with the first symptoms of the infection (=day of infection) or the day before. Invasive ventilation is defined as supportive or controlled continuous mechanical ventilation (including during weaning) via a tracheostoma or endotracheal tube. • Procedures to support breathing/expand the lungs are counted as INV ventilation if they are administered via a tracheostoma or endotracheal tube (e.g. CPAP via tube)

Optional field when selecting the "non-invasive ventilation" surveillance component	
With non-invasive ventilation methods (=NIV-associated)	Bronchitis/pneumonia is non-invasive ventilation-associated (NIV-associated) if non-invasive ventilation has taken place for at least the 3rd day on the day with the first symptoms of the infection (= day of infection) or the day before. Non-invasive ventilation is defined as mechanical positive pressure ventilation of a patient (controlled, assisted or in pressure support mode) with different pressure levels in inspiration and expiration via mask systems (nasal mask, face mask, full face mask or respiratory helmet) without the simultaneous presence of an endotracheal tube. **Note on CPAP**: The sole application of continuous positive airway pressure (CPAP) via mask systems does NOT constitute ventilation and **is therefore NOT recorded as a NIV form of ventilation**.
None	Marking if INV or NIV association according to the above definitions has not taken place, or non-invasive ventilation has taken place but no surveillance is carried out for this.

Primary bloodstream infection (BSI)	These include laboratory-confirmed primary bloodstream infection (B1), in certain patients with immunodeficiency/suppression Mucosal Barrier Injury Laboratory-Confirmed Bloodstream Infection (B3), in children≤ 12 months also clinically diagnosed primary bloodstream infection (B2). Selection according to the KISS definitions
Central vascular catheter (usually CVC) (=ZVK-associated)	(only for patients with bloodstream infection) Tick if the definition of device association applies: Primary bloodstream infection is associated with a CVC if a CVC was present for at least the 3rd day on the day with the first symptoms of infection (= day of infection) or the day before, but the definition of an ECLS association does not apply. If the patient had a peripheral and a central vascular access, developed bloodstream infection and the infection clearly originated from the peripheral catheter, enter "no" here.
Optional fields when selecting the "ECLS" surveillance component	
ECLS (ExtraCorporeal Life Support) (ECLS-associated)	Primary bloodstream infection is associated with ECLS if vascular access for ECLS procedures was available for at least the 3rd day on the day with the first symptoms of infection (=day of infection) or the day before. *ECLS* are extracorporeal methods for oxygenation and decarboxylation of the blood. These include Pump-driven lung replacement procedures • ECMO (Extracorporeal Membrane Oxygenation)/ECLA (Extracorporeal Lung Assist) • ECCO2-R (extracorporeal CO2 elimination) • ILA-activve Pumpless extracorporeal lung assistance • pECLA (pumpless ECLA) • ILA® (interventional extracorporeal lung support) If the patient had a peripheral catheter and an ECLS catheter or a CVC and an ECLS catheter, developed bloodstream infection and the infection clearly originated from the peripheral catheter or the CVC, enter "no" here.
Total parenteral nutrition	(only for patients with bloodstream infection) Mark "yes" if a patient has received total parenteral nutrition within 48 hours before the onset of the first symptoms/findings.
Optional fields when selecting the "VD-associated meningitis"	

surveillance component	
Meningitis/ ventriculitis	G2 (meningitis or ventriculitis) according to the KISS definition
Ventricular drainage (=VD-associated)	Tick if the definition of the device association applies: Ventricular drainage (VD)-associated meningitis/ventriculitis is present if an external ventricular drainage was in place for at least the 3rd day on the day with the first symptoms of infection (=day of infection) or the day before. External ventricular drainage = external ventriculostomy to drain cerebrospinal fluid (CFS) via a drain (drainage to the outside) or for intraventricular measurement (= pressure probe directly in the cerebral ventricular system, registration of intracranial pressure (contact with CFS, CFS extraction possible))
Other infections	If other infections are recorded for internal quality management as part of surveillance on the ward: code other nosocomial infections according to the KISS definitions (e.g. gastroenteritis: I1).
Other:	
Secondary bloodstream infection (BSI):	Mark if secondary bloodstream infection occurs as a complication during the survival period in the context of a nosocomial infection reported to KISS. Secondary bloodstream infection to be recorded is bloodstream infection confirmed by a blood culture that is associated with a nosocomial infection elsewhere. In the case of secondary bloodstream infection, the pathogen detected and its antibiogram must match the primary source of infection. For example, a patient with a nosocomial urinary tract infection has a positive blood culture and if the pathogens and the antibiogram of the blood and urine culture are identical, the infection is reported as a urinary tract infection with secondary bloodstream infection. Secondary bloodstream infection is not recorded individually.
Patient deceased	Mark if the patient died during the survival period (regardless of the cause of death).
Remarks	For your own notes. In particular, points that could be of importance for internal quality management should be documented here (e.g. special risk factors of the patient, special circumstances).

Laboratory

Pathogen detection	Indication of whether an etiologically relevant pathogen was detected (selection: yes/no)
Pathogen 1/2/3/4	Specification of up to four etiologically relevant pathogens from the selection lists. **The following applies to respiratory tract infections:** Yeasts, coagulase-negative staphylococci (CNS) and enterococci (including VRE) are not considered pathogens of a respiratory tract infection in KISS surveillance (unless they are detected in pleural fluid or lung tissue). Candida albicans and other Candida spp. are only recognised as pathogens of respiratory tract infections in patients who meet the definition of immunodeficiency/suppression (see KISS definitions). In addition, the following pathogens are not accepted as pathogens of nosocomial respiratory tract infections in surveillance: Cryptococcus, Histoplasma, Coccidiodes, Paracoccidiodes, Blastomyces, Pneumocystitis. **The following applies to urinary tract infections:** Only bacterial pathogens are considered pathogens of a urinary tract infection in KISS surveillance. Viruses or fungi are not permitted as pathogens of urinary tract infections!
Material	Entry only required for respiratory tract infections: Specify the test material from which the pathogen was identified (tracheal secretion, bronchial secretion (BAL)/protected brushings (PSB), blood, other).

5.4 Monthly sheet for intensive care units

The monthly form for intensive care units is ideally completed by the intensive care unit staff. The six figures to be documented for each day are recorded daily at the same fixed time of day (e.g. as part of the midnight statistics).

Finally, monthly totals for the individual columns are calculated from the monthly sheet (an example sheet is shown in the appendix).

The following information is required (documentation always at the same time of day if possible (e.g. midnight statistics).

Month/year	Month and year from which the data originates
Table:	
Number of newly admitted patients	Number of all patients admitted to the ward in the last 24 hours (including patients only present for a short time who are no longer present at the time of documentation, e.g. at midnight).
Number of patients	Number of patients at the time of the count (even patients who have only recently been admitted and are present at the time of the count are counted; documentation should always be done at the same time of day, e.g. midnight).
Number of patients with	
HWK	Number of patients with a transurethral indwelling catheter at the time of counting (suprapubic urinary diversion is not counted)
ZVK	Number of patients with a central vascular catheter at the time of counting (patients with two or more central vascular accesses are NOT counted twice).
INV	Number of patients with invasive ventilation (INV) at the time of counting Invasive ventilation (INV) is defined as supportive or controlled continuous mechanical ventilation (including during weaning) via a tracheostoma or endotracheal tube. - Procedures to support breathing/expand the lungs are counted as INV ventilation if they are administered via tracheostoma or endotracheal tube (e.g. CPAP via tube)

Optional fields when selecting the corresponding surveillance components	
NIV	Number of patients with non-invasive ventilation (NIV) at the time of counting NIV = mechanical positive pressure ventilation of a patient (controlled, assisted or in pressure support mode) with different pressure levels in inspiration and expiration via mask systems (nasal mask, face mask, full face mask or respiratory helmet) without the simultaneous presence of an endotracheal tube. A ventilation day with non-invasive ventilation is incurred if a patient is on a day was ventilated for **at least 6 hours** according to the above definition. It is irrelevant whether the ventilation was continuous or discontinuous, the total ventilation time with NIV for this day is essential. **Note on CPAP**: The sole application of continuous positive airway pressure (CPAP) via mask systems does NOT constitute ventilation and **is therefore NOT recorded as a NIV form of ventilation**.
VD	Number of patients with external ventricular drainage (VD) at the time of counting External ventricular drainage = external ventriculostomy to drain cerebrospinal fluid (CFS) via a drain (drainage to the outside) or for intraventricular measurement (= pressure probe directly in the cerebral ventricular system, registration of intracranial pressure (contact with CFS, CFS extraction possible)) Not included: ventriculoperitoneal shunts or intraparenchymal measurements where the pressure probe is located directly in the brain tissue (no contact with CFS), subdural and epidural measurements!
ECLS	Number of patients with a vascular catheter for ECLS procedures. *ECLS* are extracorporeal methods for oxygenation and decarboxylation of the blood. These include Pump-driven lung replacement procedures • ECMO (Extracorporeal Membrane Oxygenation)/ECLA (Extracorporeal Lung Assist) • ECCO2-R (extracorporeal CO2 elimination)

- ILA-activve

Pumpless extracorporeal lung assistance

- pECLA (pumpless ECLA)
- ILA® (interventional extracorporeal lung support)

5.5 Annual data - number of blood cultures analysed in the previous calendar year

This information is required once a year in webKess. It is necessary if participation in infection surveillance in ITS-KISS took place for at least one month in the previous calendar year. Please always enter the total number of blood cultures sent for microbiological diagnostics for the intensive care unit for the entire year, regardless of how many months you have carried out KISS infection surveillance there.

Notes on counting:
A blood culture usually consists of an aerobic and an anaerobic bottle (counts as one blood culture), e.g:

- a blood sample from a peripheral vein and inoculation of an aerobic and an anaerobic blood culture bottle
  = 1 blood culture

Samples taken from different sites or at different times count as separate blood cultures, e.g:

- one blood sample at 08:00 and one blood sample at 10:00
  = 2 blood cultures (regardless of how many bottles are inoculated)
- a blood sample from a peripheral vein and a blood sample from the CVC
  = 2 blood cultures (regardless of how many bottles are inoculated)

5.6 Pathogen of nosocomial infections

A maximum of four pathogens can be documented for an infection.
The pathogens including special characteristics (e.g. resistance) can be selected from a selection list in webKess. Pathogens that have been detected in cultural or non-cultural procedures and are considered to be etiologically relevant for the infection should be specified.

6 Literature

Emori TG, Culver DH, Horan TC et al. National Nosocomial Infections Surveillance (NNIS) System: Description of surveillance methods. Am J Infect Control 1991;19:19-35.

The National Healthcare Safety Network (NHSN), Patient Safety Component in acute care hospitals/facilities, http://www.cdc.gov/nhsn/acute-care-hospital/index.html

National Nosocomial Infections Surveillance System. Nosocomial infection rates for interhospital comparison: Limitations and possible solutions. Infect Control Hosp Epidemiol 1991;12:609-21.

Horan TC, Emori TG. Definition of key terms used in the NNIS System. Am J Infect Control 1997; 25: 112-116.

Geffers C, Koch J, Sohr D et al. Development of a reference database for nosocomial infections in intensive care units. Anaesthesist 2000; 49:732-737.

Handbuch für die Surveillance von nosokomialen Infektionen (Manual for the Surveillance of Nosocomial Infections) (Federal Ministry of Health publication series, Volume 142, ISBN 3-7890-8088-8).
The handbook can be requested from: Federal Ministry of Health, P.O. Box, 53108 Bonn (one free copy).

Definitions of nosocomial infections for surveillance in the Hospital Infection Surveillance System (KISS definitions). Available for download on the NRZ website (www.nrz-hygiene.de).

7 Appendix

The listed forms serve as an overview and can be used for internal recording. However, the data is forwarded to the NRC electronically.

7.1 Monthly sheet for KISS intensive care units

Hospital: _____ month / year: _____

Ward: _____ Type of intensive care unit: _____

Day	Number of newly admitted patients	Number of patients	Number of patients with					
			HWK	ZVK	INV*	NIV**	VD***	ECLS****
1								
2								
3								
4								
5								
6								
7								
8								
9								
10								
11								
12								
13								
14								
15								
16								
17								
18								
19								
20								
21								
22								
23								
24								
25								
26								
27								
28								
29								
30								
31								
$\sum$								
	Patients	Patient days	HWK Days	ZVK days	INV days	NIV days	VD days	ECLS Days

***INV=continuous invasive mechanical ventilation via tube/tracheostoma, **NIV= non-invasive ventilation, ***VD= external ventricular drainage, ****ECLS=ExtraCorporeal Life Support**

7.2 Completed monthly form for intensive care units

Hospital: _____AAA_____Month / Year: XX/XXX

Ward: __XY_____Type of intensive care unit: internal medicine_____

Day	Number of newly admitted patients	Number of patients	Number of patients with					
			HWK	ZVK	INV*	NIV**	VD***	ECLS****
1	*0*	*6*	*6*	*6*	*3*	*2*	*1*	*0*
2	*1*	*7*	*6*	*6*	*3*	*1*	*0*	*0*
3	*1*	*8*	*7*	*7*	*3*	*2*	*0*	*0*
4	*2*	*8*	*7*	*6*	*2*	*2*	*0*	*0*
5	*0*	*8*	*7*	*6*	*2*	*2*	*0*	*1*
6	*3*	*9*	*8*	*7*	*3*	*1*	*0*	*1*
7	*1*	*10*	*9*	*7*	*3*	*1*	*0*	*1*
8	*2*	*9*	*8*	*7*	*3*	*1*	*1*	*1*
9	*0*	*8*	*7*	*7*	*2*	*2*	*1*	*1*
10	*1*	*8*	*7*	*7*	*2*	*2*	*0*	*1*
11	*1*	*6*	*6*	*6*	*2*	*2*	*2*	*1*
12	*2*	*8*	*7*	*6*	*3*	*2*	*2*	*1*
13	*2*	*10*	*9*	*8*	*3*	*2*	*2*	*1*
14	*1*	*10*	*9*	*8*	*4*	*2*	*3*	*1*
15	*0*	*10*	*9*	*8*	*3*	*2*	*3*	*1*
16	*2*	*9*	*9*	*9*	*3*	*2*	*1*	*1*
17	*3*	*10*	*9*	*9*	*2*	*1*	*1*	*1*
18	*1*	*8*	*7*	*7*	*2*	*1*	*2*	*1*
19	*1*	*7*	*5*	*5*	*2*	*0*	*2*	*1*
20	*2*	*7*	*6*	*6*	*3*	*0*	*2*	*1*
21	*0*	*7*	*5*	*5*	*4*	*0*	*0*	*1*
22	*1*	*6*	*6*	*5*	*4*	*1*	*1*	*1*
23	*2*	*8*	*7*	*6*	*3*	*1*	*1*	*1*
24	*0*	*7*	*6*	*6*	*3*	*1*	*0*	*1*
25	*2*	*7*	*6*	*6*	*2*	*1*	*0*	*0*
26	*1*	*7*	*6*	*6*	*1*	*1*	*0*	*0*
27	*1*	*5*	*5*	*4*	*2*	*1*	*0*	*0*
28	*2*	*6*	*6*	*5*	*2*	*1*	*2*	*0*
29	*2*	*7*	*7*	*7*	*3*	*1*	*2*	*0*
30	*2*	*7*	*7*	*6*	*2*	*1*	*0*	*0*
31	*1*	*7*	*7*	*6*	*1*	*1*	*1*	*0*
$\sum$	**40**	**240**	**216**	**200**	**80**	**40**	**30**	**20**
	Patients	Patient days	HWK Days	ZVK days	INV days	NIV days	VD days	ECLS Days

***INV=continuous invasive mechanical ventilation via tube/tracheostoma**
****NIV= non-invasive ventilation, ***VD= external ventricular drainage**

7.3 Infection recording form for intensive care units
- ITS-KISS-

(Only to be completed for patients with nosocomial infections. Only one infection per sheet)

Hospital:		Station:	
Patient identifier:		Type of intensive care unit:	
Recording date:	Gender: w☐ m☐		Year of birth:

INFECTION DATA

Date of infection (date of first symptoms)**:**

Urinary tract infection: SYMP (D1)☐ ASYMP with secondary bloodstream infection (D2)☐ OTHER (D3)☐

Associated with urinary catheters: yes☐ no☐

Laboratory diagnosis (pathogen):

Lower respiratory tract infection: Pneumonia (C1a)☐ (C1b)☐ (C1c)☐ (C1d)☐

Bronchitis/tracheobronchitis/tracheitis (J1)☐ Other respiratory tract infection (J2)☐

associated with mechanical ventilation:

Invasive via tube/tracheostoma (INV) yes☐ Non-invasive (NIV) yes☐

No association with ventilation ☐

Examination material: Tracheal secretion☐ BAL/PSB☐ Blood☐ Other☐

Laboratory diagnosis (pathogen):

Primary bloodstream infection: Laboratory confirmed (B1)☐ Clinical diagn. (B2) (only children≤ 12 months☐

Mucosal Barrier Injury Laboratory-Confirmed Bloodstream Infection (B3) (immunocompromised patients only) ☐

Associated with CVC: yes☐ no☐ Associated with ECLS: yes☐ no☐

Total parenteral nutrition (within b of 48h): yes☐ no☐

Laboratory diagnosis (blood pathogen):

Meningitis/ventriculitis: (G2)☐ Laboratory diagnosis (pathogen):

External ventricular drainage (VD): yes☐ no☐

other infections: Laboratory diagnosis (pathogen):

COMPLICATIONS

Secondary bloodstream infection: yes☐ no☐ **Death**: yes☐ no☐

Remarks

8 Imprint

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