Clinical course of bloodstream infections in Thuringia – data from the first 12-months report of the Thuringian blood culture registry AlertsNet

AlertsNet Thüringen

Karch A[1], Schmitz RPH[2], Rißner F[3], Kortegast M[2], Jakob M[2], Mikolajczyk RT[1], Brunkhorst FM[2,3]

[1]Department of Epidemiology, Helmholtz Center for Infection Research (HZI) , Braunschweig
[2]Center for Sepsis Control and Care (CSCC), Jena University Hospital
[3]Center for Clinical Studies, Jena University Hospital

Universitätsklinikum Jena

HELMHOLTZ ZENTRUM FÜR INFEKTIONSFORSCHUNG

Center for Sepsis Control & Care

Background

- Bloodstream infections (BSIs) are a leading cause of death worldwide (1,2).
- Population-based surveillance provides the best approach for
  - defining the burden of bloodstream infections,
  - evaluating risk factors for acquiring infections, and
  - monitoring temporal trends in occurrence and resistance of pathogens (3).
- In 2013, the first German population-based surveillance study for BSIs has been established in Thuringia (AlertsNet).

Objectives

- To report data on the clinical course of bloodstream infections from the first 12 months of the population-based surveillance study AlertsNet.
- To derive overall and focus-specific case fatality rates and to investigate risk factors for death in patients with bloodstream infections enrolled in AlertsNet.

Study design and study population

- AlertsNet is a population-based study including data on three levels:
  - microbiological data on pathogens and resistance profiles for each blood culture taken in the participating institutions,
  - clinical data (including daily updated information on antibiotic treatment) for all patients with clinically relevant positive blood cultures,
  - institutional data (e.g. case mix index) in order to allow comparisons between institutions adjusted for institution-specific criteria.
- Analyses are based on the first 12-months report of AlertsNet (01 May 2014 to 30 April 2015).
- In this time period, patients from 7 clinical institutions represented by four microbiological laboratories were assessed for inclusion in this analysis.
- All patients with a clinically relevant positive blood culture (according to a pre-defined algorithm) and a completed case report form were enrolled.

Methods

- Demographic and clinical data of all enrolled patients were obtained from participating hospitals and linked to blood culture results collected via the automated electronic blood culture registry included in AlertsNet.
- Information on underlying causes as well as on disease progression was analyzed using measures of descriptive statistics.
- Risk factors for death were determined using multivariable logistic regression models.

Results 1 – clinical course of bloodstream infefections

- In total, 812 patients with one to six positive blood cultures were included (Table 1).

Table 1: Demographic and baseline characteristics of included patients (n=812)

Characteristics	Study particpants (n=812)
Age in years (median; IQR)	71 (59-79)
Female sex (%)	40.8
Surgery in the last 30 days (%)	29.2
Central line in place (%)	44.1
Mechanical ventilation (%)	14.9
Urinary catheter (%)	40.5

- The majority of patients (60.8%) suffered from nosocomial BSIs: 70.4% on a general ward and 29.6% on intensive care units.
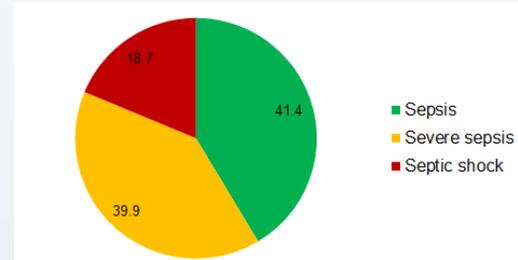- BSIs were associated in 58.6% with organ dysfunction (Figure 1).

Figure 1: Maximum clinical severity of bloodstream infections in study population (n=812)

Results 2 – case fatality rates of bloodstream infections

- The overall hospital case fatality rate of the study population was 23.3%.
- Patients developing septic shock showed a case fatality rate which was about five times as high as the one of patients suffering from sepsis without organ dysfunction (58.3 vs. 11.7%, Figure 2).
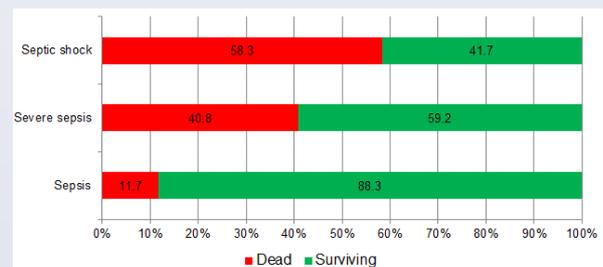

Figure 2: Case fatality rates by clinical severity of bloodstream infection (n=812)

Results 3 – risk factors for death in bloodstream infections

- Bloodstream infections based on the primary focus of pneumonia showed the highest case fatality rates of all underlying foci (34.6% vs. 22.1%).
- In a multivariable analysis, pneumonia as a primary focus remained one of the major predictors for death besides measures of disease severity like need for central line and mechanical ventilation (Table 2).

Table 2: Risk factors for death obtained from a multivariable logistic regression model

Risk factor	Odds Ratio (95% CI)*
Pneumonia as primary focus	2.05 (1.38-3.05)
Presence of central line	1.53 (1.09-2.17)
Presence of mechanical ventilation	1.92 (1.33-2.79)

*adjusted for age and sex

Conclusions and outlook

- AlertsNet provides data on patients with a wide clinical range of bloodstream infections.
- Risk factors for a fatal disease outcome known from other studies could be replicated underlining the internal validity of AlertsNet.
- Future analyses will focus on pathogen-specific characterizations of clinical disease courses.

References

1. Laupland KB, Gregson DB, Flemons WW, et al. Burden of community-onset bloodstream infection: a population-based assessment. Epidemiology and infection 2007;135(6):1037-42
2. Engel C, Brunkhorst FM, Bone HG, et al. Epidemiology of sepsis in Germany: results from a national prospective multicenter study. Intensive care medicine 2007;33(4):606-18
3. Laupland KB. Defining the epidemiology of bloodstream infections: the 'gold standard' of population-based assessment. Epidemiology and infection 2013;141(10):2149-57

Acknowledgements