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

Karch A1, Schmitz RPH2, Rößer F3, Kortegast M2, Jakob M2, Mikolajczyk RT1, Brunckhorst FM2,3

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

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 infections

- 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)

<table>
<thead>
<tr>
<th>Characteristics</th>
<th>Study participants (n=812)</th>
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</thead>
<tbody>
<tr>
<td>Age in years (median, IQR)</td>
<td>71 (59-79)</td>
</tr>
<tr>
<td>Female sex (%)</td>
<td>40.8</td>
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<tr>
<td>Surgery in the last 30 days (%)</td>
<td>29.2</td>
</tr>
<tr>
<td>Central line in place (%)</td>
<td>44.1</td>
</tr>
<tr>
<td>Mechanical ventilation (%)</td>
<td>14.9</td>
</tr>
<tr>
<td>Urinary catheter (%)</td>
<td>40.5</td>
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</table>

- 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).

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).

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>
<thead>
<tr>
<th>Risk factor</th>
<th>Odds Ratio (95% CI)*</th>
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<tr>
<td>Pneumonia as primary focus</td>
<td>2.05 (1.38-3.05)</td>
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<tr>
<td>Presence of central line</td>
<td>1.53 (1.09-2.17)</td>
</tr>
<tr>
<td>Presence of mechanical ventilation</td>
<td>1.92 (1.32-2.79)</td>
</tr>
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*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


Acknowledgements

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