Introduction and purpose

Enterococci are low virulent commensals in the gastrointestinal tract. Resistance to vancomycin was first described in the late 1980s. Since then, vancomycin-resistant enterococci (VRE) have been emerging as a cause for health care associated infections. It was reported earlier that VRE infections are associated with a longer length of stay, higher hospital costs and increased mortality rates. 

Methods

Data collected during 2012 to 2017 in a large tertiary care hospital in Leipzig, Germany, were analysed. Patients with VRE infection or colonisation were identified and compared to patients without VRE and with vancomycin-sensitive enterococci (VSE), respectively. All analyses and statistical tests were performed with the R software package. Specimens tested positive for VRE infection and taken more than 72 hours after admission defined as VRE. Definition of VRE infection as follows: detection of the pathogen in primarily sterile fluids or tissues such as blood cultures, joint aspirates and cerebrospinal fluids.

Results

Between 2012 and 2017 VRE were detected in 720 patients (0.23%). During the study period a median and absolute increase in VRE isolations was seen from 95 (0.23%) in 2012 to 167 cases (0.41%) in 2017 (p<0.05, fig. 1). Infection with VRE was present in 39.7% of the patients with VRE detected (p<0.05; fig. 2). The majority of VRE isolates was nosocomial (91% patients; 76.2%; p<0.001).

Length of stay (LOS) was five days longer for patients with VRE compared to those without (36.44 days; 95% CI: 31.18; 40.77 vs. 7.11 days; 95% CI: 7.07; 7.14; p<0.001). Patients with VRE infection had a 10 days longer hospital stay compared to those with colonisation (42.23 days; 95% CI: 37.96; 46.48 vs. 32.93 days; 95% CI: 30.93; 35.23; p<0.001). Although VRE had a significant impact on the length of stay as well (p<0.001).

Mortality was significantly higher in patients with VRE compared to all patients (OR 12.03; 95% CI: 10.16; 14.26; p<0.001). There were 198 deaths in the VRE group and 239 deaths in the control group (relative mortality rate 2.77%). Also, median survival time was lower in the VRE group (82 vs. 141 days; p<0.001). Compared to the outcomes of both patients with VRE and patients with VSE showed no significant difference (fig. 4b). Furthermore, looking at blood stream infections (BSI) and sepsis a significant difference in survival was not seen (fig. 4c).

Compared to patients without VRE both colonisation (96 vs. 141 days; p<0.0001) and infection with VRE (83 vs. 141 days; p<0.0001) decreased the median survival. Presence of VRE was associated with higher mortality independently from other factors (HR 1.47; 95% CI: 1.19; 1.80; p<0.05; fig. 5). Hazard of death increased with age and Charlson co morbidity score (2200 HR for age = 1.29; 95% CI: 1.12; 1.46; p<0.05 and 6.00 HR for Charlson score = 3.77; 95% CI: 2.82; 4.82; p<0.001). The median time to VRE detection after admission was 11 days. The mean LOS of all patients was 7.11 days (95% CI: 7.07; 7.14). At this timepoint, 36% of the VRE cases had been detected (fig. 6).

Conclusions

- VRE case numbers increased within six years
- Most patients were colonized by VRE
- Risk of VRE acquisition increases with the LOS
- Survival time of patients with VRE presence was significantly shorter compared to the ones without
- Patients without VRE both have an independent impact on mortality and LOS in hospitalised patients
- A significant difference between colonization and infection with VRE and VRE regarding mortality was not seen
- VRE isolates in our hospital had favourable resistance profiles against daptomycin, tigecycline and linezolid, but showed relevant resistance against teicoplanin and minocycline
- Effective strategies are necessary to reduce the spread of VRE

Impact of vancomycin-resistant enterococci infection and colonisation on patient outcomes

A retrospective study in a German tertiary care hospital


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