Objectives: Differences in the incidence of central line-related bloodstream infections (CRBSIs) among European hospitals are due to a range of varying factors such as case mix, infection control practices, and organizational culture. The PROHIBIT study aims at inventorying and analysing national and local infection prevention activities in Europe and to test two interventions of proven efficacy in CRBSI reduction.

Methods: Between January 2011 and June 2013, one or more intensive care units of fourteen hospitals from 11 European countries were randomized to implement one or both of the following interventions: 1) the WHO hand hygiene strategy; and 2) a CRBSI prevention strategy based on a successful central venous catheter (CVC) bundle programme of the University of Geneva hospitals. Randomization followed a stepped-wedge design: after a baseline period of 6 months, every quarter, three hospitals were randomized to one of the three intervention arms (hand hygiene [HH] alone, CVC bundle alone, and both interventions together). The last hospitals started intervention in July 2012. Primary outcome was CRBSI, secondary outcomes were compliance with hand hygiene and the CVC bundle.

Results: In total, data were collected from 35,831 catheters accumulating 262,377 CVC days and 382 CRBSIs. CRBSI incidence at baseline and in the intervention period were 2.4/1000 CVC days (interhospital range 0.0–8.1) and 0.9/1000 (range 0.0–3.8), respectively. This reduction was significant (relative risk [95% CI]: 0.39 [0.32-0.48]).

Cox regression analysis, accounting for patient and CVC characteristics and modeling hospital as clusters, revealed that the HH intervention alone (hazard ratio [HR] [95% CI]: 0.46 [0.24-0.86]) and both interventions combined (HR: 0.50 [0.30-0.84]) significantly reduced CRBSI. The CVC bundle alone only resulted in a non-significant trend towards CRBSI reduction (HR: 0.63 [0.37-1.06]). The baseline incidence density in this group was ≤1.0.

The mean baseline CVC bundle compliance of 3.3% (range 0.0–47.2) increased to 38.7% (0.0–83.8) for the hospitals that had implemented the CVC bundle (alone or in combination). In the HH hospitals the baseline bundle compliance rose from 6.0% (0.0–37.5) to 26.2% (0.0–55.6). The figure shows the median compliance and interquartile range with the overall CVC bundle and the individual items for all hospitals. The mean baseline HH compliance was 46.8% (range 16.9-62.7) and improved to 60.6 (34.7-89.6) for hospitals that implemented the HH campaign alone or in combination with the CVC bundle. These hospitals showed a slightly larger increase in HH than the CVC hospitals, increasing from 51.3 (46.0–66.9) to 62.2 (44.1-84.7).

Conclusion: Our findings confirm variations of CRBSI incidence densities among ICUs in European hospitals. HH and HH in combination with a CVC bundle were independently associated with CRBSI reduction, particularly in hospitals with higher baseline rates.