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ePoster Viewing

Antimicrobials: antibiotic usage

Evaluating and benchmarking antibiotic use in German university hospitals

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Introduction
Previous studies indicate intensive antibiotic use density levels in tertiary care hospitals including many broad-spectrum agents likely to be associated with the development of bacterial resistance among nosocomial pathogens and high expenditures. We have repeatedly evaluated antibiotic use in German university hospitals in a sentinel network and present here data from 11 hospitals for the year 2013. Five of these hospitals had participated in an earlier (first-in-this consortium) study (1998-2000) that used the same methodology (de With et al, IJAA 2004). The aim was to provide detailed consumption data allowing to discuss possible quality indicators and achievable benchmarks for overall and service-specific and antibiotic class use.

Methods
Pharmacy data were transformed into WHO-defined DDD and hospital-adapted “recommended daily doses” (RDD, compensating for nonrealistic WHO-DDD definitions [in particular for iv penicillins and oral cephalosporins]) per 100 patient (occupied bed) days. Analyses were done for different specialty services (excluding pediatrics and psychiatry) and for normal ward versus intensive care (ICU) areas. Antibiotic classes included narrow-spectrum (NSPen) and broad-spectrum (BSPen) penicillins, aminopenicillin-ß-lactamase inhibitor combinations (AmpßLI), 1°+2° versus 3°generation cephalosporins, carbapenems, quinolones (FQ), aminoglycosides, tetracyclines (incl. tigecycline), macrolides/clindamycin (ML/clinda), glycopeptides (incl. daptomycin), cotrimoxazole (TSX-TMP) and others (mainly metronidazole).

Results
The overall use density was 55 RDD/100 (median, IQR 47-58, range 46-66) or 78.5 DDD/100 (IQR 71-83, range 69-99) (Figure). Major differences in hospital-wide antibiotic class use (>5-fold, irrespective of whether DDD or RDD estimates were used) were observed for 3°generation cephalosporins, AmpßLI, and aminoglycosides whereas small differences (<2-fold) were seen for carbapenems. Similar differences between hospitals were discovered when repeating the same analyses for different specialty services and normal versus ICU wards except that hematology-oncology departments showed major (>5-fold) differences in FQ use. Hospital-wide, the median proportion of cephalosporins was 26% (RDD, range 15-36) to 28% (DDD, 15-31), and for penicillins it was 24% (RDD, 18-38) to 28% (DDD, 21-45), respectively. The FQ proportion was 14% (DDD range 9-17; RDD range 10-16). A comparison of antibiotic use densities in the core services medicine (incl. hematology-oncology) and surgery of the 5 hospitals that participated in both 1998-2000 and 2013 surveys showed substantial increases both for medicine (medians, +18% DDD/100, +19% RDD/100) and surgery (+32% or +56%, respectively).

Conclusions
The substantially increased overall use and major differences in the use of 3°generation cephalosporins and penicillins in university hospitals are key findings in the present work, and reference values for overall hospital-wide and service-specific use could be calculated. If intense use of 3°generation cephalosporins and dominance of cephalosporins over penicillins were to be linked with adverse consequences such as increased ESBL, VRE and/or CDI incidence, an important set of quality indicators and presumably achievable benchmarks could now be constructed.

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