Temporal trends of Enterobacteriaceae with resistance to higher generation cephalosporines in Switzerland, 2004 to 2010

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Background

Multidrug resistant gram-negative Enterobacteriaceae, are increasing world-wide in hospital and community-settings due to rapid spread of extended spectrum betalactamase (ESBL). So far ESBL-epidemiology in Switzerland has not been described systematically.

Aims

To describe and to compare temporal and regional trends of third or fourth generation cephalosporin-resistance (3GR) in Escherichia coli and Klebsiella pneumoniae in Switzerland.

Methods

To describe the temporal trends of 3GR E. coli and K. pneumoniae we used data from the laboratory-based nation-wide surveillance system ANRESIS (www.anresis.ch).

- ANRESIS collects routine resistance data of actually 23 Swiss laboratories.
- ANRESIS includes in- and outpatient resistance data of all Swiss regions. Outpatient data includes data from private physicians as well as data from outpatient clinics.
- For temporal trends 2004-2010 we included data from 16 laboratories / 40 hospitals sending data continuously since 2006.
- For temporal trends 2004 – 2010 we included data from 11 laboratories / 34 hospitals sending data continuously since 2004.
- Only one isolate per patient and year was included in the analysis.

Conclusion

In Switzerland, resistance to 3rd generation cephalosporines among E. coli and K. pneumoniae is increasing at low but constant rates since 2004. Increase is comparable in the hospital and outpatient setting, but is higher in hospitals with >500 beds than in smaller hospitals. While in E. coli 3GR is significantly higher in east- than in south-west Switzerland in 2010 there was a trend for higher 3GR in K. pneumoniae in south-west Switzerland in 2010.

Results

Data representativeness

Inpatient data
- According to the Swiss hospital statistics 2007 (www.bag.admin.ch) the 40 hospitals included in our study covered 43.3% of acute care hospital beds in south-west and 33.6% in east-Switzerland
- In 2007 samples analyzed for this study covered 3 Mio beddays

Outpatient data
- 50.2% of outpatient data were from medical practitioners, 49.2% from outpatient clinics. Resistance rates were comparable in both subgroups (data not shown).
- In total data from 2214 medical practitioners were included in this analysis.
- According to the statistics of Swiss physicians 2009 (www.fmh.ch) this survey covered 9.3% of medical practitioners of south-west and 17.9% of east Switzerland.

Methods

3GR in Switzerland 2010

Inpatient data
- From 2004 – 2010 3GR increased from about 1 to 4% in south-west and from 1 to 5% in east-Switzerland.
- Increase was comparable in in- and outpatients.
- In outpatients data were congruent for analysis from 2004 onwards and 2006 onwards.
- In inpatients inclusion of one >500bed hospital in south-west Switzerland in 2006 led to higher 3GR rates. However the increase rate was comparable.

Temporal trends for E. coli

Temporal trends for K. pneumoniae

Subgroup analysis (data 2004-2010 pooled)
- 3GR increase was observed in all age groups and in urinary samples as well as in blood cultures.
- 3GR increase was more pronounced in bigger hospitals and occurred in all hospital departments.
- As in E. coli 3GR increase was observed in all subgroups and was more pronounced in bigger hospitals.
- The peak in patients <2years in 2006 was caused by an outbreak in a single hospital.