

Trends in antibiotic use and antimicrobial resistance in French hospitals: 2008-2010

Data from the nationwide network "ATB-RAISIN"

C. Dumartin (1,2), A.-M. Rogues (1,2), F. L'Héritau (3), M. Péfau (1), X. Bertrand (4), P. Jarno (5), S. Boussat (4), M. Giard (6), A. Savey (6), P. Angora (5), L. Lacavé (3), O. Ali-Brandemeyer (4), A. Machut (6), S. Alfandari (7), E. Rémy (8), B. Schlemmer (9), S. Touratier (10), S. Vaux (11), for ATB-RAISIN network.

1. Unité INSERM 657, Bordeaux Segalen University, Bordeaux 2. Southwest Regional Centre for healthcare associated infections Control (CCLIN), Bordeaux. 3. Paris and North CCLIN, Paris. 4. East CCLIN, Nancy. 5. West CCLIN, Rennes. 6. South-East CCLIN, Lyon. 7. French Infectious Diseases Society (SPILF) 8. Regional observatories for medicine, medical devices and innovation (Omedit). 9. President of the National Committee for prudent use of antibiotics. 10. Pharmacy, CHU St-Louis, Paris. 11. Public Health Institute (InVS), St-Maurice, France.

Background

Objectives

- French programmes to control antimicrobial resistance (AMR) and antibiotic (AB) use put an emphasis on surveillance in hospitals
- Yearly nationwide surveys since 2008 through the network ATB-RAISIN
- To monitor trends in AB use and AMR in hospitals
- To provide a tool for benchmarking
- To identify areas for improvement at the national level and at hospital level

Methods

- Retrospective surveys in voluntary hospitals to collect 2008, 2009 and 2010 data, using the national surveillance network ATB-RAISIN methodology (auto-questionnaire)
- Data collected :
 - Administrative data : hospital status, number of beds and number of patients-days (PD) each year
 - Antibiotic consumption for inpatients, expressed in number of defined daily doses (DDD) per 1000 PD for all AB for systemic use: class J01 of WHO Anatomical Therapeutic Chemical classification, ATC-DDD system + rifampicin and oral imidazole derivatives
 - AMR: incidence of susceptible strains for specified AB/bacteria combinations, expressed in number of strains per 1000 PD

Results

Increasing participation of hospitals

- Increase in the coverage of ATB-RAISIN network, enabling to provide useful benchmark and to monitor trends in a large number of facilities (table 1)
- A cohort of 662 hospitals provided data each year

Table 1: Participation and antibiotic use in number of DDD/1000PD, ATB-RAISIN surveys, 2008 - 2010

	2008	2009	2010
No. participating hospitals	861	997	1115
Coverage (/ No. PD at national level)	44%	51%	52%
Coverage (/ No. beds at national level)	42%	50%	52%
Total antibiotic use	369	379	374
No. = number of			

Contrasted changes in AMR

- Information on AMR was provided by 528 hospitals in 2008, 603 in 2009 and 621 in 2010
- Rates of AMR in 2010 were (table 2)
 - lower for *Staphylococcus aureus*
 - lower or similar for *Pseudomonas aeruginosa*
 - higher for Enterobacteriaceae

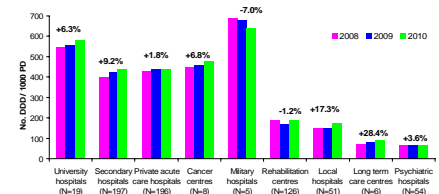
Table 2: Incidence of antimicrobial resistance in selected bacteria, in number of strains/1000PD, ATB-RAISIN surveys, 2008 - 2010 in all hospitals providing data each year

	2008	2009	2010
Methicillin resistant <i>S. aureus</i>	0.55	0.5	0.48
<i>Enterobacter cloacae</i> resistant to cefotaxime	0.19	0.2	0.2
<i>Escherichia coli</i> resistant to cefotaxime	0.25	0.32	0.36
<i>Pseudomonas aeruginosa</i> resistant to ceftazidime	0.22	0.2	0.19
<i>Pseudomonas aeruginosa</i> resistant to imipenem	0.23	0.25	0.23

Trends in antibiotic use in 662 hospitals, 2008- 2010

- In 622 hospitals participating each year: slight increase in antibiotic use (pooled mean, no. DDD/1000 PD) by 3% each year
366 in 2008 → 378 in 2009 → 389 in 2010
- Variations according to hospital status, consistent with differences in activity and patient case-mix (figure 1).
- No change in the number of DDD: 16 867 795 in 2008, 16 880 695 in 2010 (+ 0.1%)

Figure 1: Trends in antibiotic use according to hospital status, in number of DDD/1000PD, 2008-2010, N = 622.



Use of beta-lactam antibiotics in 662 hospitals, 2008-2010

- Major increase in the use of beta-lactam antibiotics (figures 2 and 3) and in imidazole derivative use: 12.2 DDD/1000 PD in 2008 and 14.4 DDD/1000 PD in 2010 (+18%)

Figure 2: Beta-lactam antibiotic use in number of DDD/1000PD, in 662 hospitals, 2008-2010.

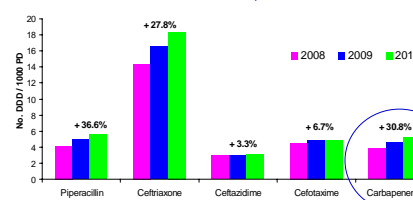
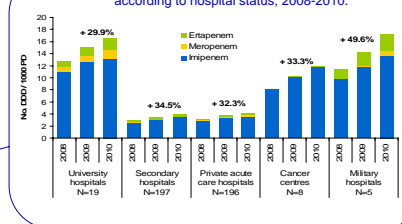


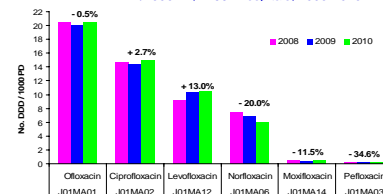
Figure 3: Carbapenem use in number of DDD/1000PD, according to hospital status, 2008-2010.



Fluoroquinolone use in 662 hospitals, 2008-2010

- Fluoroquinolone use remained stable: 52.5 DDD/1000 PD in 2008 and 52.4 DDD/1000PD in 2010
- Fluoroquinolone use accounted for 13.5% of total antibiotic use in 2010, among which:
 - ofloxacin: 5.3%;
 - ciprofloxacin: 3.8%;
 - levofloxacin: 2.7%.

Figure 4: Changes in fluoroquinolone use in number of DDD/1000PD, in 662 hospitals, 2008-2010.



Conclusions

Advantages of the national network ATB-RAISIN

- Assessment of trends in AB use and AMR in a large number of hospitals
- Promotion of benchmarking and provision of help to hospitals with high AB use to analyse results and implement improvements

Worrisome trends - in France - in Europe

- In French hospitals, despite the national action plan: AB use did not decrease when expressed in DDD/1000 PD and AMR in Enterobacteriaceae was higher in 2010
- Carbapenem use increased in: Sweden (+9%); the Netherlands (+37% between 2007 and 2009); Denmark (+49%)

Perspectives

- Urgent actions needed to decrease the use of last-line agents such as carbapenems and ceftriaxone through restriction of dispensation, medical education and development of practice audits
- Increasing participation in ATB-RAISIN network will enable to study trends in both AB use and AMR and to monitor the impact of measures for prudent use of antibiotics in a large cohort of hospitals