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Paper Poster Session

Surveillance and control of nosocomial pathogens and infection

Real-time surveillance of bacteria and antibiotic resistance over 15 months using BALYSES and MARSS surveillance systems, Marseille, France

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Background: Infectious diseases represent major and unpredictable causes of morbidity and mortality worldwide. Hence, efficient surveillance systems are warranted. Since 2002, we created at university hospitals of Marseille several automated real-time epidemiological surveillance systems to detect abnormal epidemiological events linked to infections using data from our routine clinical microbiology laboratory. These systems include EPIMIC, implemented in 2002, and BALYSES and MARSS, implemented in 2013, more specifically to survey bacteria and antibiotic resistance. We present here results from the weekly surveillance by BALYSES and MARSS over a 15-month-period.

Material/methods: Surveillance conducted using BALYSES and MARSS was studied from July 2014 to September 2015 (65 weeks). Both tools have been developed on Microsoft Excel. Over the study period, BALYSES and MARSS weekly analyzed data from the Timone microbiology laboratory information systems. Thus, weekly number of samples positive for each item monitored by the systems were compared to their mean historical weekly values more or less two standard deviations. Systems triggered alarms if values exceed the thresholds. All the emitted alarms were weekly analyzed during a specific thematic epidemiology meeting with laboratory staff to determine what to do for each of them.

Results: Over the 65 weeks period, culture isolation of bacteria was performed on 255,513 clinical samples from 13,470 patients. These samples included 125,747 blood cultures (49.2%), 46,901 urine samples (18.4%) and 12,268 deep samples (4.8%). A total of 62,267 bacterial isolates (mostly *Escherichia coli* (13,361; 21.5%) and *Staphylococcus aureus* (9,647; 15.5%)) were recovered, and 44,363 bacterial antibiotic susceptibility testing were performed (for 71% of bacteria isolated). During this period of time, BALYSES and MARSS emitted 1,145 alarms (18 / week). Among them, 61(47 emitted by MARSS and 14 by BALYSES) led to epidemiological and clinical investigations, and 40 were finally identified as true epidemiologic events, leading to 18 official reports to the French Health Regional Agency. For instance: BALYSES detected in February 2015 an abnormal increase in the weekly number of *Enterococcus faecalis* infections involving 60 patients. First investigations allowed identifying that most of the cases were community-acquired urinary tract infections (22 patients, 37%); MARSS detected several nosocomial outbreaks of carbapenem-resistant *A. baumannii* (7 patients) and *Klebsiella pneumoniae* (10 patients).

Conclusions: Our automated surveillance tools triggered multiple alerts and allowed improving the control, prevention, and treatment of infections. A next step is to implement a web-based platform to merge all our surveillance systems for more accurate monitoring and alert management. We are also extending our surveillance to a representative panel of private and public clinical microbiology laboratories of the Provence-Alpes-Côte d'Azur French region, which encompasses ≈7% of the French population.