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"RAISIN" – A NATIONAL PROGRAMME FOR EARLY WARNING, INVESTIGATION AND SURVEILLANCE OF HEALTHCARE-ASSOCIATED INFECTION IN FRANCE

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Surveillance is a key component of the French plan for prevention of healthcare-associated infection (HAI) and has progressively evolved in the past decades. We describe the development and current organisation of surveillance of HAI in France and summarise key achievements and results. Surveillance of HAI is under the auspice of the national institute for public health surveillance through a central coordinating structure, the Réseau d'alerte, d'investigation et de surveillance des infections nosocomiales (RAISIN), which consists of five regional coordinating structures, two national advisory committees of the Ministry of Health and public health agencies. Surveillance includes the performance of national prevalence surveys every five years (latest in 2006), specific surveillance networks to follow trends and characterise HAI that are national priority, and mandatory reporting of HAI that meet specific criteria for alert purposes. RAISIN prioritises activities, defines technical specifications of surveillance systems, coordinates their implementation, and supports response to alerts, emergences or outbreaks of HAI. We demonstrate that the French surveillance program of HAI has become comprehensive and contributes to evaluating the impact of control and prevention of HAI. Data from RAISIN indicate a general decrease in the risk of HAI in acute care in France. They show a decrease in HAI during recent years, particularly of those related to methicillin-resistant *Staphylococcus aureus* (MRSA) for which a drop of 38% was documented between 2001 and 2006. RAISIN is also integrated into European surveillance of HAI coordinated by the European Centre for Disease Control.

Background

Healthcare-associated infections (HAI) are leading causes of morbidity and mortality among hospitalised patients [1]. Five to 10 % of patients admitted to acute care hospitals acquire during their stay one or more infections according to recent European prevalence surveys [2-4].This proportion is greater in immuno-compromised patients and patients with underlying diseases, undergoing invasive procedures, admitted to an intensive care unit (ICU) and the elderly. In a multicenter study of tertiary-care hospitals, HAI contributed to the death of 2.8% of patients that died 48 hours after admission. Extrapolated nationwide this indicates that HAI may account for about 4,200 deaths per year in France [5]. Outbreaks of HAI are frequent and may spread between HCF through patient transfers [6]. Also HAI cause disability, reduce quality of life and create emotional stress [7, 8]. Effective infection control measures may prevent 20 to 30% HAI [9-11]. Surveillance is a key element of the control and prevention of HAI because it provides data relevant for appropriate intervention methods [10-13]. HAI have a growing social and political impact in many western countries with aging populations because the elderly are more susceptible to infections and require increasingly intensive healthcare [14,15]. In France, surveillance of HAI is integrated in the national HAI control and prevention program which was implemented more than two decades ago [16]. In this paper, we describe the organisation of HAI surveillance in France and its main outcomes.

Organisation of HAI control and prevention in France

The control, prevention and surveillance of HAI are based on interacting local, regional and national structures with complementary roles. Their organisation and coverage have developed progressively since 1988 and have been reinforced on several occasions All public HCF (since 1988) and private HCF (since 1999) are legally obliged to set up an infection control committee to define an HAI control program that is implemented by a control team. French authorities recommend one infection control nurse for 400 beds and one infection control practitioner for 800 beds; smaller HCF share infection control personal through networks. Five interregional infection control coordinating centers, Centre de coordination de la lutte contre les infections nosocomiales (CClin), were created in 1992 to coordinate control, prevention, counseling, surveillance and training activities and support hospitals in implementing the national program (Figure). Each CClin coordinate a network of regional antenna (n = 23), legally instituted in 2006. At the national level, two committees advise the Ministry of Health: one on strategic orientations, the other one is an expert committee that produces recommendations for the prevention of adverse health care events, including HAI.

Figure. Nosocomial infection surveillance coordination structures and locations, France

Surveillance of HAI in France

A first survey of HAI was conducted in 46 hospitals in 1990 after this, the first large scale surveillance activity was a national prevalence survey in 1996 which was repeated in 2001and 2006 [18-21]. Surveillance HCF, participating on voluntary basis (hereafter referred to as voluntary HCF), targeting high priority HAI were developed by the CClin from 1993 onward. The system was completed in 2001 by a mandatory notification of HAI events, described in the section *Notification of HAI, alert and response to outbreaks*, to provide timely assistance to HCF for control purpose [22]. Surveillance of HAI was initially implemented through an interregional coordination level under the Ministry of Health. With the creation of a national institute for public health surveillance, Institut de Veille Sanitaire (InVS) in 1998, the coordination for HAI surveillance moved to the InVS. A coordinating structure that gathers in a contractual way the InVS, the five CClin, the Ministry of Health and its advisory committees and other public health agencies and bodies involved in HAI prevention was therefore set up: the Réseau d'Alerte, d'Investigation et de Surveillance des Infections Nosocomiales (RAISIN, nosocomial infection early warning, investigation and surveillance network). It prioritises surveillance activities, defines technical specifications of HAI surveillance, coordinates implementation of surveillance programs and studies and assists in investigating outbreaks [23].

Definitions for nosocomial infections

The definitions used for surveillance were adapted from the United States' Centers for Disease Control and Prevention (CDC) in 1992 [24,25] and further updated in 1999 to take into account long-term care patients [26] and surgical site infections (Table 1) [27,28]. In 2007, definitions for HAI were updated and expanded to outpatients care structures [29].

Table 1. Definitions for Hospital-acquired infection (HAI) and Surgical site infections (SSI) in France

Surveillance activities

Prevalence surveys

Three national HAI prevalence surveys were performed in 1996, 2001 and 2006, to advocate and train HCF for HAI surveillance and control, to estimate the burden from HAI describe their characteristics and assess trends over time [19-21]. All public and private HCF were invited to participate. Participating HCF enrolled on a given day in June all inpatients present that day. Standardised questionnaires were used by trained investigators to collect data from medical records, microbiological laboratories, temperature charts and interviews with physicians or nurses. Data included characteristics of the participating HCF and patients: age, sex, admission date, individual risk factors including immunosupression, the Mac Cabe Score [30], extrinsic risk factors such as presence of a urinary or a vascular catheter and surgery within 30 days prior to the time of the survey. Up to three HAI were recorded for each patient. For each HAI, date of onset, infection site, microorganism and source were recorded. Each HCF entered data using dedicated software for validation, analysis and standardised reporting for feedback. Data were then transferred to CClin for aggregation and analysis at regional level, and to InVS, which managed the national database, analysis and report.

The number of HCF and patients included increased overtime. However, the number of patients per HCF decreased due the smaller size of newly recruited hospitals (Table 2). Results were relatively stable for most parameters in all three surveys, however, the prevalence of HAI, infected patients and methicillin-resistant *Staphylococcus aureus* (MRSA) decreased from 1996 to 2006, especially after 2001 (Table 2). Comparisons between 2001 and 2006 were restricted to 1,351 HCF that participated in both surveys, used similar case definitions and were adjusted for all available confounding variables to account for changes in methods in 2006 (exclusion of asymptomatic bacteriuria) and the inclusion of smaller hospitals in most recent survey. The multivariate analysis indicated a 12 % decrease in the prevalence of infected patients and of 38% for infection with MRSA [21].

Table 2. Participation and main results of nosocomial infection point prevalence surveys, France, 1996 to 2006

Incidence surveillance networks

Since 1993, five incidence surveillance networks of voluntary HCF were set up: surgical site infections (SSI), intensive care units (ICU), blood and body fluids exposure (BBFE), bloodstream infections (BSI) and multidrug-resistant bacteria (MDRB) infections. The first two networks use the methodology proposed by the United States National Nosocomial Infections Surveillance System (NNIS) system and produce standardised indicators [72]. Denominator data collection is, however, patient-based and not aggregated by unit of care which allows adjustment on individual risk factors. Surveillance of BBFE uses the method proposed by the American National Surveillance System for Healthcare Workers (NaSH) [73]. The BSI and MDRB networks are laboratory-based. For each surveillance network, data are collected, entered and analysed by participating HCF using dedicated software. Data are sent to CClin for validation and aggregation into a regional database for analysis. Surveillance methods that were implemented through the five CClin were standardised nationwide between 1999 and 2003, and regional data are now aggregated into national databases [31]. Annual national HAI surveillance reports are available on the Raisin website [23]. Current efforts focus on facilitating data collection and on developing new indicators such as the standardised incidence ratio [32].

Surveillance of surgical site infections (SSI): the ISO-Raisin network

Since 1999, regional SSI surveillance data are aggregated into a national database. Each year, CClin include voluntary surgery wards for a two or three months survey of at least 200 surgical patients each (excluding re-interventions) with a post-operative 30 day-follow-up. Data include risk factors (age, sex, score of the American Society of Anesthesiologists, [33] pre- and post-operative hospital stay, type and duration of procedure, emergency/elective procedure, video-endoscopy and Altemeier wound class) and SSI, if any [34, 35]. Participation increased from 1999 to 2006. from 230 (8.2%) to 568 (20%) of the 2,804 public and private HCF (Table 3). The annual number of procedures rose from 79,803 in 1999 to 193,946 in 2006. Incidence of SSI varied according to NNIS score from 0.85% for the lowest risk patients (NNIS-0) to 12.92% for the highest risk patients (NNIS-3). In this group, SSI incidence decreased over time (Table 3). Among

NISS-0 patients, SSI icidence significantly decreased for herniorraphy (-70%), cholecystectomy (-55%), appendicectomy (-53%), colon surgery (-33%), caesarean section (-56%), and breast surgery (-39%) [36-38-]. Surveillance of SSI is well accepted and provides standardised indicators to evaluate prevention. It suggests a positive impact of the French national HAI control program, at least in lower risk patients.

Surveillance of HAI in intensive care units (ICUs): the REA-Raisin network

The REA (Réanimation)-Raisin targets device related-infections in ICUs: ventilator-associated pneumonia (PNE), central venous catheter colonisation (COL) with or without catheter-related infection/bacteraemia (CRI/CRB), urinary tract infections (UTI) associated with indwelling urinary catheter and BSI. Six months per year, voluntary ICU collect for data for patients hospitalised more than two days in the ICU on patients' characteristics (age, sex, admission date), risk factors (trauma, antibiotic treatment, diagnosis category, immunosupression, new simplified acute physiology score -SAPS II [39], invasive devices) and infections. Incidence rates are adjusted per 1,000 device-days [40]. In 2006, 158 ICUs (accounting for about 25% of French ICU) included 22,090 patients, of whom 3,113 (14.1%) had at least one infection (5,284 nosocomial events). The most frequent micro-organisms were *Pseudomonas aeruginosa* (15.0%), *E. coli* (14.8%), *S. aureus* (14.0%), *Candida albicans* (5.7%) and *S. epidermidis* (5.5%) ; 39,5% of *S. aureus* strains were resistant to methicillin in 2006 (2004: 48.7%). Incidence rates decreased from 2004 to 2006 for PNE (-5.9%), COL (-16.9%), BSI (-1.5%) and UTI (5.9%) [40-42] which suggest an improvement for HAI in ICU (Table 2).

Surveillance of blood and body fluids (BBFE) exposure: the AES-Raisin network

The AES (Accident d'Exposition au Sang)-Raisin network monitors the incidence of reported occupational BBFE in French healthcare workers. Since 2002, a prospective national follow-up of healthcare workers has been set up in tertiary hospitals, local medical centers and specialised psychiatric centers [43]. All reported BBFE are documented by the occupational physician using an anonymous standardised questionnaire [44]. In 2006, 518 HCF, accounting for 18% of 2,804 French HCF and 43% of hospital beds, recorded 14,876 BBFE; the majority of these (72%) were needle-stick injuries. Around half (48.6%) of 12,123 percutaneous injuries were avoidable through adherence to standard precautions. The BBFE incidence rate was 8.0 per 100 hospital beds (Table 3), 1.5 per 100 full-time equivalent physicians, 6.5 per 100 full-time equivalent nurses and 1.8 per 100 full-time equivalent nurses 'aides. Human immunodeficiency virus (HIV) serology was unknown in 3,353 (22.5%) patients that were the source of a BBFE.

Extrapolating results nationwide, it was estimated that 35,418 BBFE occurred in 2006 in France. In 173 HCF that participated over all years, compliance to glove use increased from 60.6% in 2004 to 66.1% in 2006 and sharps disposal containers accessibility increased from 65.2% to 68.6%, while BBFE incidence decreased slightly (Table 3) [45].

Surveillance of bloodstream infections (BSI): the BN-Raisin network

Surveillance of BSI was conducted from 2002 to 2004 through the BN-Raisin network. It provided a reference for the incidence, microbial ecology and origin of acute invasive HAI to assess the impact of control measures for specific routes of infection [46]. The laboratory-based network included all wards of voluntary HCF for three months each year. In 2004, 286 HCF (10% of public and private HCF) participated. For each nosocomial BSI a standardised questionnaire documented patients' characteristics (age, sex, type of hospital and medical specialty), source of the bacteraemia, organisms and antibiotic susceptibility and follow-up for seven days after onset of bacteraemia. Incidence was calculated per 1,000 patient days (pd) [47]. In 2004, overall incidence was 0.45 (Table 3). Among identified sources, venous catheters and urinary tracts catheters were the most common (24.9 and 24.8% respectively). The main microorganisms isolated were *E. coli* (20.5% of isolated pathogens, 2.8% of which produced extended-spectrum beta-lactamase - ESBL), *S. aureus* (24.9%, 41.4% of which were MRSA) and coagulase-negative *Staphylococci* (24.8%). Death occurred in 11.8% patients with BSI and was more frequent in patients infected with *P. aeruginosa* (21.5%) than patients with BSI caused by other bacteria (11.22%). These results indicate that venous and urinary tract catheter-related bacteraemia should be targeted for prevention with priority.

Surveillance of hospital-acquired multidrug-resistant bacteria (MDRB): the BMR-Raisin network

France is one of the European countries mostly affected by MDRB, particularly MRSA [48]. The BMR (Bactériémie Multirésistante)-Raisin network assesses the impact of national efforts on the incidence of MDRB HAI. Data on MRSA and ESBL-producing *Enterobacteriaceae* are collected prospectively three months a year from all diagnostic specimens other than screening isolates; duplicates, strains with the same susceptibility profile per patient, are excluded and incidence rates per 1,000 pd are calculated and stratified by type of ward [49].

In 2006, 675 HCF participated (24% of the 2,804 public and private HCF) a 41% increase since 2002. The MRSA incidence was 0.55 per 1,000 pd and greater in acute (0.65) and in intensive care (1.91) than in rehabilitation and long term care facilities (0.37). In 255 HCF that participated from 2003 to 2006, MRSA incidence decreased by 15% (Table 3). The ESBL incidence was 0.17 per 1,000 pd in 2006; it was twice higher in acute care (0.20) compared to rehabilitation and long term care facilities (0.11). Among the 228 HCF that participated from 2003 to 2006 incidence of ESBL increased from 0.17 to 0.19 (+12%, Table 3) in line with a growing proportion of *Escherichia coli* among *Enterobacteriaceae* species (2003:25%; 2006: 43%). These results suggest a positive impact of the HAI national program on hospital-acquired MRSA [50]. In contrast, the emergence of ESBL, especially for *E. coli*, is of concern [50,51]. Similar trends have been observed by the National Observatory for the Study of Antimicrobial Resistance (Observatoire National de l'Etude de la Résistance Bactérienne aux Antibiotiques - Onerba), [52], an independent organisation that promotes standardisation of methodologies, conducts descriptive studies on antimicrobial resistance and contributes to the European Antimicrobial Resistance Surveillance System (EARSS) since 2001 [48,53,].

Table 3. Annual participation and trends in healthcare-associated infections incidence through RAISIN (Réseau d'alerte, d'investigation et de surveillance des infections nosocomiales) incidence surveillance networks, France, 1999 – 2006

Notification of HAI, alert and response to outbreaks

Prevalence or incidence surveys do not cover all hospitals and HAI and do not allow prompt detection of emerging HAI or outbreaks. Therefore, a national HAI infection notification system was implemented in 2001 to detect unusual events

outbreaks. Therefore, a national HAI infection notification system was implemented in 2001 to detect unusual events, promote early outbreak investigation and control and identify emerging problems. HCF have to notify HAI to CClin and the district health authority, which in turn inform the InVS. Notification criteria are:

- rare or severe infections, concerning microorganism characteristics (i.e. resistance), the infection site, a contaminated device/product or practice failure;
- infections leading to death;
- airborne or waterborne infection (e.g., legionellosis);
- otherwise reportable diseases (e.g., tuberculosis etc.).

As the system is designed to detect unusual events, there is no restrictive list of events to notify. The reporting form includes the nature of the event and main characteristics, investigations and control measures performed, and allows to request assistance [22,54,55]. At the national level, InVS provides support for outbreak investigation and analyses data to detect unusual trends.

From 8 January 2001 to 12 December 2006, the InVS received 4,117 notifications from 918 HCF (33% of all HCF in France), accounting for 12,561 HAI and 1,482 deaths (13%). Twenty-six percent notifications (1,059 out of 4,117) were related to clusters (ranging from 2 to 178 cases) and external assistance was requested for 8% (319). The average monthly notifications increased from 30 in 2001 to 80 in 2006. The median time between an event and notification to InVS decreased from 62 days in 2001 to 9 days in 2006. The most frequently used notification criteria were related to microorganisms (33%), deaths associated with HAI (15%), infection sites (13%), airborne/waterborne HAI (11%), contaminated devices (6%), or practice failures (3%). The most frequently notified microorganisms were *S. aureus* (15%, 47% of which were MRSA), *Enterobacteriaceae* (11%, 72% of which produced ESBL), *Acinetobacter* (9%, 28% of which were imipenem-resistant), *P. aeruginosa* (8%, 37% of which were imipenem-resistant and 27% ceftazidime-resistant), or *Legionella* (7%). *Enterococcus faecalis* or *E. faecium* accounted for 3% of all notifications, 91% of which were vancomycin-resistant (VRE) [55].

Table 4. Mandatory notification criteria and cumulative number, France, 2001 – 2006

Today, the system is well accepted; it provides daily assistance in outbreak investigation and control to HCF, and allowed the early detection and control of outbreaks or emerging pathogens at local, regional or national level, such as an outbreak of hepatitis C in a hæmodialysis unit in 2001 [56], an outbreak of VEB-1 ESBL-producing *Acinetobacter baumannii* in northern France in 2003 [6], an outbreak of *Enterobacter sakazakii* associated with a contaminated powdered infant formula in 2004 [57], the national emergence of VRE in 2005 [58] or of 027/NAP1 *Clostridium difficile* in 2006) [59]. Following the detection and extensive investigation and follow-up of these major events, national recommendations were updated accordingly or issued where not available.

Specific studies through the RAISIN network

Specific studies are performed through Raisin to assess the impact of a particular threat or document and characterise a specific HAI issue. We illustrate the benefits of three such nation-wide public health oriented studies.

Survey to estimate the presence of glycopeptide intermediate S. aureus *(GISA)*
In 1999, following reports of clinical isolates of *S. aureus* with reduced susceptibility to glycopeptides (Glycopeptide intermediate *S. aureus* – GISA, being intermediately resistant to teicoplanin and susceptible to vancomycin) a survey was carried out in 2000 and 2001 to estimate the incidence of GISA and their proportion within MRSA strains. An optional GISA module was proposed to hospital laboratories participating in MDRB surveillance. During one month, each first MRSA strain isolated from a clinical sample was documented with a standardised questionnaire and then screened for GISA using recommendations from the French Society for Microbiology. One hundred and sixty-five volunteer hospitals included 2,066 patients with a clinical MRSA isolate, 254 (12%) of which were suspected to be GISA, however, only 45 (2.2%) were confirmed GISA, an incidence of GISA of 2.3 per 100,000 pd. Analysis of the antibiotic susceptibility profiles suggested that most strains were closely related to the gentamicin-resistant MRSA clone that was responsible for the MRSA epidemic in French hospitals until 1995 [60]. Although this study confirmed the presence of GISA strains in French hospitals in 2000-2001, such strains were rarely identified by French hospitals.

Survey on risk of bacterial pneumonia from defective bronchoscopes
In 2002, flexible bronchoscopes of the same brand were recalled after a defect (a loose biopsy-port cap in the bronchoscopes) that reduced the efficacy of disinfection procedures and might be responsible of transmitting infections from patients to patients was identified by the French Health products safety agency (Agence Française de Sécurité Sanitaire des Produits de Santé Afssaps). InVS and CClin assessed the risk of bacterial pneumonia among patients exposed to these medical devices in a retrospective study including the last 30 patients in each participating HCF exposed to the bronchoscopes before they were recalled. Of 347 HCF contacted, 211 (67%) participated in the survey and traced 4,112 patients for exposure to 97 (85%) of 114 defective bronchoscopes. One bacterial pneumonia (0.07%) was documented among exposed patients within 2 to 10 days after exposure. In addition we found that 16 (1.3%) patients were colonised or infected with a *Mycobacterium* on the day of bronchoscopy, in nine cases *Mycobacterium tuberculosis*. This demonstrated that tracing patients exposed to specific bronchoscopes was possible in French hospitals, suggested that the risk of bacterial pneumonia associated with the defective bronchoscopes was low but that exposure of patients to transmission of mycobacterial infection was possible if the bronchoscopes were not adequately reprocessed after use [61].

National survey to assess the prevalence of hepatitis C virus and hygiene practices in dialysis units
Following a large outbreak of hepatitis C virus (HCV) infection in a dialysis unit in 2001 [56] a national survey was undertaken to assess the prevalence of HCV and of hygiene practices in dialysis units. Two complementary studies were carried out: one through Raisin and the French Nephrology Society who sent a standard mail questionnaire to all hæmodialysis units between October and December 2004 and a second was an observational audit of infection control

practices on a 10% random sample of dialysis units. Of 873 hæmodialysis units, 477 (55 %) participated, 200 dialysis centers and 277 autodialysis units. HCV prevalence was 6.6 % in hæmodialysis centers and 5.9 % in autodialysis units. The audit of practices survey indicated a high level of compliance with infection control recommendations but identified breaches for which corrective actions were needed [62].

Laboratory support to surveillance

In France, laboratory support to surveillance (detection, typing and molecular epidemiology) is performed through a network of 47 national reference centers (NRC) funded by InVS and designated every four years through a call for tender. The list of NRC is revised regularly by a national committee and their specific missions and tasks are defined according to surveillance needs [63]. Several NRC provide an important contribution to surveillance and outbreak investigation of HAI caused by pathogens such as MRSA, *P. aeruginosa*, *Legionella*, hepatitis C virus, or glycopeptide-resistant *Enterococcus*. Following *C. difficile* 027 introduction in 2006 in France, a network of five regional laboratories (one in each CClin area) coordinated by a specific NRC was created to enhance the national capacity of typing of *C. difficile* strains isolated from patients suffering severe disease or outbreaks identified through the mandatory notification system. This close institutional interaction between routine surveillance activities, detection of new emerging infectious threats and the planning of reference laboratory resources greatly facilitated the response to 027 *C. difficile* spread in French hospitals [59]. A prospective surveillance of *C. difficile* infections has been implemented in 2009.

Discussion

The surveillance of HAI in France has gradually evolved over two decades to become comprehensive finally. It has documented encouraging results in recent years which probably reflect the positive impact of control and prevention efforts. The collegial management of a comprehensive system through Raisin allows standardisation of protocols and a close interaction between private and public hospitals, regional structures and national public health agencies. The very high level of participation of hospitals in the 2006 national prevalence survey illustrates the effectiveness of this three level - national, inter-regional and local- approach.
The surveillance activities in which Raisin is involved include planned surveys, surveillance networks and assistance to investigation of and response to unusual HAI events. These complementary activities allow each participating structure a comprehensive understanding and knowledge of the HAI epidemiology, which facilitate response and public health actions and finally promote the prevention of HAI. The generic and flexible early warning system for HAI has clearly and repeatedly shown a strong added value to prevalence studies and surveillance networks. It supports HCF in the control of outbreaks that may spread to other hospitals regionally or even nationally. Besides regional or national alerts described previously, it also allowed responding to recurrent outbreaks such as several outbreaks of hepatitis C transmission in health care settings [64,65].

Efficient surveillance is resource intensive. Because of reporting delays, often required complex analysis (including risk-adjustments), and the voluntary participation of HCF, HAI surveillance has been criticised and sometimes felt not linked enough with day-to-day action by consumers and policy planners. Pushed by a strong social demand, the French Ministry of Health has implemented a national program of mandatory patient care performance indicators in all HCF. The first published indicators are scores related to the HCF efforts to control and prevent nosocomial infection and of appropriate use of antibiotics [66,67]. Additional indicators are under consideration and include the rate of MRSA infection in HCF. The Raisin database on hospital-acquired multidrug-resistant bacteria (BMR-Raisin) was extensively used to help define and construct this last indicator. However, publicly reported performance data cannot replace surveillance because HAI, surveillance has a unique value in the evaluation of efforts to reduce the incidence and prevalence of HAI.
On a European level, Raisin, through its coordinating structure and its institutional integration with the InVS, has permitted to interact efficiently with European surveillance and early warning schemes, which since 2005 are part of the European Centre for Disease Control (ECDC) mandate. French SSI surveillance data are included from 2004 to 2006 in the Hospitals in Europe Link for Infection Control through Surveillance (HELICS) database, representing 86,434 (17%) of the 521,186 procedures included in HELICS-SSI database [38] and for 57,963 (41%) of the 142,558 patients included in the HELICS-ICU database [42]. France collaborates actively to the European Early Warning and Response System (EWRS) for HAI threats that may spread to other European Member States [68]. The link between the EWRS and the HAI notification system is made by InVS as part of its risk assessment of alerts. If an HAI event is severe and may spread to other Member States, the EWRS is used to inform all EU partners and ECDC about the nature of the event, its potential risk of spread and the measures taken to limit its spread [69]. This was done for several severe outbreaks such as the VEB-1-producing A. baumannii outbreak in hospitals in northern France [6], an international outbreak of *Klebsiella pneumoniae* infections in patients of an hepatic surgery centre [70], and the 027 *C. difficile* outbreak in 2006 [59]. The timely share of authoritative information between national public health authorities before it has been published and communicated via the media is extremely useful to national and EU public health authorities in order to anticipate and plan and coordinate response.

A European HAI surveillance scheme implies some adjustment of national systems with the commonly agreed European methodology. When this will be done in all Member States, the comparison of rates and of trends overtime by countries will become legitimate and may yield interesting insights regarding quality and structure of care across Europe. However, comparison of rates needs to be done carefully, as differences in healthcare systems, methodologies, and sample sizes may have a huge influence on rates and their significance [71]. In Europe, the methods, case definitions and data collected on HAI are not harmonized, which preclude comparison of results and burden of HAI between EU Member States. European harmonisation of surveillance schemes for HAI such as prevalence surveys, SSI and ICU surveillance need further European consideration.

As France is now in its 2009-2012 plan for the prevention and control of HAI, surveillance will continue to be adjusted to new developments and challenges. Foreseen evolutions include the evaluation and adjustment of current surveillance networks, the move of the HAI notification system which is still done through paper forms to a fully electronic scheme and the extension of surveillance to HAI that occur in health care settings other than hospitals.

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