Health-Care Associated Infections: Prevention & Control Program

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Background: Organization and Structures dedicated to infection control & evaluation tools (France)
Infection Control Structures Operating in France: the 3 levels

**Local (hospital) level**
- Local Committee: ICCs (1988-1999)
- Infection control teams (ICT, 1999)

**Regional & inter-regional**
- Interregional coordinating centres for infection control (CCLINs, 1992)
- Regional subsidiary structures (2005)

**National level**
- Coordinating unit – NI Bureau, Ministry of Health
- Advisory Board for the National Program (2004)
- National Institute for Public Health Surveillance (InVS, 1998), coordinating the EWRS (mandatory notification of sentinel events, 2001) and
- National prevalence studies & RAISIN surveillance networks (1999-03), a partnership between InVS and the CCLINs
The current organization of structures dedicated to Prevention & Control of HCAI in France

NI Bureau

Regional Health agencies

Healthcare facilities

Advisory Board for the National Program

Patient’s Safety Expert Committee (HCSP)

5 Inter-regional coordinating centers for Infection Control (C-CLIN) + 22 Regional IC divisions

Inf. Control Committee (ICC, CLIN)

Inf. Control Team (ICT, EOH)

Link nurses / physicians in wards

http://www.infectiologie.org.tn
The 5 Interregional Coordinating centers

- Promotion & implementation of the national program
- Expert assistance to ICC and IC teams & documentation
- Organisation of national surveys and surveillance networks
- Follow-up and investigation of mandatory notifications
French national NI surveillance system:

1. National network of networks (RAISIN, 2001): targeted surveillance programs for *benchmarking and follow-up of the national program*, coordinated by the French national Institute for Public Health Surveillance (InVS), and the 5 Inter regional Coordinating Centers (C-CLINs)

2. National Prevalence surveys (c. every 5 years)

3. Alerts and sentinel events: early warning system (mandatory notification, decree 26/07/2001)
Surveillance and Alerts

http://www.invs.sante.fr/raisin/

- **National network of networks** (RAISIN, 2001), jointly coordinated by the National Institute for Public Health Surveillance (InVS), and the 5 Inter regional Coordinating Centers (C-CLINs)

- 5 targeted surveillance programs (standardised methods):
  - Surgical site infections (2002);
  - Multidrug-resistant bacteria (MRSA, ESBL; 2002);
  - Antibiotic use (2008)
  - Blood and body fluid exposures of personnel (2002);
  - Nosocomial bacteremia (2002);

- Additional ‘labelled’ networks (Pediatrics, Hemodialysis, ..)

http://www.infectiologie.org.tn
Defining Priorities: The (“first”) national NI control program

2005 – 2008

Key considerations & incentives: the evolving environment of infection prevention & control

- **Adapting/strengthening** the national structures and organisation:
  - evolving structures and institutions (National agencies: patients’ safety, networks: RAISIN,...),
  - emerging inter-disciplinary activities (risk management, quality insurance programs...)

- **Integrating new priorities:**
  - Diagnosis and management of NI,
  - Increasing role of infection control teams (ICT),
  - Nursing homes / Rehabilitation / LTC / Ambulatory care

- Perceived need for **process/performance indicators** and **public disclosure**: Public health law / qualitative & quantitative indicators
  - **Public reporting**: information & patients’ rights – risk perception / media
Objectives & Evaluation measures


PROGRAMME NATIONAL DE LUTTE CONTRE LES INFECTIONS NOSOCOMIALES 2005 – 2008

Un dispositif spécifique en place au niveau local, régional national

- **A National Program** for control of nosocomial infections in all health-care facilities, 2005-2008.
  - 5 key priorities
  - A coordinated action plan transposed at the 3 operating levels

- Setting goals and indicators for public reporting:
  - 12 objectives as 2008 targets for all HCF
  - 5 Indicators (all HCFs) for piloting and public reporting at the national level:
    - To monitor the progresses of infection control activities in HCF and provide an incentive for institutions and governing bodies to improve IC & quality of care in all hospitals, and to inform the public

http://www.infectiologie.org.tn
The 12 goals targeted for 2008

1. 100% HCF have an **operating ICT**
2. 100% HCF have increased their **IC activity score (ICALIN)** between 2005 / 2008 and none remain in the lower class
3. 75% HCF have **doubled their use of AHR** and
4. 100% have **reached the minimal personalized target consumption**
5. 75% HCF perform **audits** of preventive practices
6. The **prevalence of MRSA** has decreased by 25% in at least 75% HCF
7. 100% HCF have organised the mandatory reporting of **sentinel events**
8. All HCF performing surgery have organised a **surveillance program for SSI**.
9. 100% HCF have an **anti-infective drug committee**.
10. 100 % HCF have elaborated protocols for good **antimicrobial prescribing and monitor antibiotic consumption**
11. 100% HCF present their **IC program** in their **information leaflet**.
12. All HCF **provide the complete set of relevant indicators**

http://www.infectiologie.org.tn
To implement a panel of indicators in all hospitals to promote and follow-up infection control activities and better inform the public

- **Local level**
  - Implement a mandatory panel of indicators, including **processes and performance** indicators.
  - Includes **5 indicators for ALL HCFs**:
    1. Combined **organisation & infection control activities** (ICALIN).
    2. Annual volume of **alcohol-based HR used** p.1000 patient-days (ICSHA)
    3. Surveillance of **surgical site infections** per subspecialty (SURVISO)
    4. **Antibiotic policy and surveillance** of consumption (ICATB)
    5. Control of AMRB: **incidence of MRSA** p.1000 patient-days. (ISARM)

- **Regional / national level**
  - Follow-up the implementation in each HCF of the panel of indicators, and help resolve organisational problems.

Evaluation of the 2005-2008 program and indicator measures

- Based on:
  - **Process measures**: Individual and aggregated data from the mandatory annual report issued by each healthcare facility (HCF) (no. # 2800)
  - Annual reports from the Advisory Board for the National Program

- Outcomes at the national level:
  - Trends recorded in INVS-RAISIN national surveillance networks
  - Prevalence data
  - Other sources (EARSS, ..)

- Assessing quality of data:
  - Checking data from the mandatory annual report on a random sample of 10% HCFs
  - At the district level by the regional health agencies (MoH subsidiaries)
Rationale for Public reporting

- Motivating HCF management and ICT to improve the quality of care and develop a prevention program
- Evaluating results from the national program
- Responding to patients’ wishes & rights to be more and better informed
Public Reporting: Media coverage & caveats

2005: The « black list »: HCFs not performing SSI surveillance

Chirurgie : les 107 établissements qui ne surveillent pas leurs infections
An evolving presentation (and perception?):
The « safest hospitals » (2008)
1. Adapting Infection Control Structures and Organisation

- Strengthen infection control structures and bodies at all levels (local, regional/interregional & national):
  - **Objective 2008:** 100% HCFs have an operating Infection Control Team
  - **Objective 2008:** the composite score assessing infection control organisation and activities (ICALIN), has improved in 100% HCF and none remain in class E (indicator n°1);
Indicator n°1: Composite indicator of IC Organisation, Resources and Activities (ICALIN)

- First published in 2005, based on the 2004 annual report from each hospital (ICT + management)
- A 100 points score including 3 components:
  - Organization (33 pts)
  - Resources (33 pts)
  - Actions (34 pts)
- A rating system: class A to E (F non-respondents)
  - Percentiles of distribution (NHS method)
  - Reference base for building the score and determining classes: yr 2003 data
  - Stratified by (13) hospital categories

  Classes (A – E): 10 - 30 - 70 - 90 % of the maximum score

http://www.icalin.sante.gouv.fr/index.php
The overall index of IC activities, ICALIN: 3 - Activities

<table>
<thead>
<tr>
<th>Actions</th>
<th>N1</th>
<th>N2</th>
<th>N3</th>
<th>Items</th>
<th>N1</th>
<th>N2</th>
<th>N3</th>
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<td>A11 – 6 priority recommendations * 2</td>
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<td>A12 – 10 other recommendations * 0,5</td>
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<td>A21 – Notification &amp; Prevention of BBFE</td>
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</table>

http://www.infectiologie.org.tn
Global indicator of IC Organisation & Activities (ICALIN)


2008 target: 100% HCF have improved their overall process score, and none remains in the lowest class E

2009: > 90% HCFs in A-B strata & <1% in strata E

ICALIN
Composite indicator for infection control organisation, resources and activities (max. score 100), stratified by HCF categories

http://www.infectiologie.org.tn
2. Promote improved organisation of care and practices having an impact on infectious risks

- Prioritize **adherence to preventive practices** having a strong impact on the infectious risk associated with **invasive procedures** and on the **prevalence of antibiotic resistance**
  - **2008 target:** All HCF have reached class A/B of their individual target for minimal consumption of alcohol-based HR products *(indicator n°2)*
  - **2008 target:** The MRSA rate has decreased by 25% in at least 75% of HCF *(indicator n°5)*

- Develop evaluation of preventive practices by physicians and other personnel (e.g., via audit programs)
  - **2008 target:** Auditing practices is performed in at least 75% of HCF
  - National audit program (MoH directive) launched in 2005

http://www.infectiologie.org.tn
Indicator n° 2: Consumption of Alcohol-based hand rubbing products

- First released in **2006** (2005 data), expressed as the **actual consumption** (numerator) relative to a **(minimum) target objective** (denominator)
- **Numerator** = number of litres of alcohol-based products purchased annually by the HCF
- **Denominator** = “personalized objective” (minimum target to be achieved by the HCF):
  - Minimum no. derived from a literature review
  - Total patient-days for each subspecialty x minimal number of hand-rubs per day for each type of activity (medical/ surgical/ ICU/ LTC..., x 0.003 L (ie, one hand-rub))
Volume (L) of AHR products used per year

Individual HCF-specific minimum target, according to activities

Computing the individualised target: minimal no. of HR per patient-day for each of 10 subspecialties

- Medicine: 7
- Surgery: 9
- Obstetrics: 8
- Intensive Care: 48
- Hemodialysis: 6 HR / session
- ED: 2 HR / visit
- Rehabilitation: 5
- LT care: 4
- Ambulatory/Home-care: 2
- Psychiatry: 2

The target objective for a given HCF is the sum of all targets for each subspecialty in the HCF, according to the annual no. of patient-days.

- Classes IT: 10 - 30 - 70 - 90 % of the individualised target value

http://www.infectiologie.org.tn
Trends in National Indicators

ICSIA: Per cent of the individualized target consumption

Targets: by 2008, 75% HCF have doubled the annual volume of AHR used for hand hygiene, and 100% HCF have reached class B.

2009: 75% HCF have doubled their AHR consumption between 2005 & 2009; 75% HCFs have reached class A/B.

http://www.infectiologie.org.tn
Improving Hand Hygiene

- Alcohol hand rub and soap combined
- Soap
- Alcohol hand rub

Roll-out phase
Campaign refreshed
Campaign relaunched

http://www.infectiologie.org.tn
Hand Hygiene vs. MRSA

http://www.infectiologie.org.tn
2. Promote improved organisation of care and practices having an impact on infectious risks (2)

- Improve the quality of care delivered to infected patients

  - **2008 target:** An antibiotic drugs committee and a physician for antibiotic counselling is available in 100% of HCF. ([Indicator n°4](http://www.infectiologie.org.tn))

  - **2008 target:** Protocols for appropriate use of antibiotics are available in all hospitals, and antibiotic consumption is monitored ([indicator n°4](http://www.infectiologie.org.tn)).
Indicator n°4. Antibiotic Stewardship and Use (ICATB): Building the score

- First released early 2008 (2006 data)
- From a simple antibiotic consumption measure:
  - public release of consumption (no ranking),
  - and a targeted objective of decreasing overall national consumption (by 10% within 3 years)
- To a composite process indicator:
  - Score and performance ranking,
  - Using the 3 categorised groups of items (Organisation, Resources, Activities) similarly to ICALIN,
  - Scoring on 20 points (4-8-8)
  - Consumption recorded, but not scored.
## Indicator n°4: Antibiotic Policy and Use (ICATB)
Building the 3-level score

<table>
<thead>
<tr>
<th>L1</th>
<th>L2</th>
<th>L3</th>
<th>Items</th>
<th>L1</th>
<th>L2</th>
<th>L3</th>
<th>Items</th>
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<tr>
<td>O</td>
<td>1- Antibiotic drugs committee</td>
<td>1 - AB drug committee, no. of meetings</td>
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<td>R2- Information system</td>
<td>3a - Computerized connection</td>
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<td>3b - Computerized prescription</td>
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<td>R3 - Training</td>
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<td>5 - Protocols for antibiotic prophylaxis &amp; use</td>
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<td>6 - Therapeutics</td>
<td>6a - Antibiotic formulary</td>
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<td>A3 - evaluation</td>
<td>8 - Auditing antibiotic prescribing and use</td>
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</table>
Indicator n° 4: Antibiotic policy and use

**ICATB:** Composite score of Organisation, Resources, and Activities related to antibiotic policy and stewardship (max. 20)

- **A** >90
- **B** 90-70
- **C** 70-30
- **D** 30-10
- **E** <10
- **F** NR

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<th>Year</th>
<th>Score Range</th>
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<th>2007 (n=2568)</th>
<th>2008 (n=2550)</th>
<th>2009 (n=2503)</th>
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<td>19,3</td>
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<td>C</td>
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<td>38,7</td>
<td>26,1</td>
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http://www.infectiologie.org.tn
ATB-Raisin: Antimicrobial Use Surveillance

- Regional and national indicators: following trends
  - Antimicrobial selection pressure
  - By antimicrobial families or compounds
  - Trends: assessing antimicrobial stewardship policies
  - Correlations with trends in (MDR) bacteria (C. difficile, ESBL, VRE)

- One surveillance protocol for all healthcare facilities

- A base for assessing the quality of antimicrobial prescriptions

En 2012, 100% des établissements de santé concernés ont inscrit la réévaluation de l'antibiothérapie entre la 24ème heure et la 72ème heure dans la politique de bon usage des antibiotiques et évaluent son application dans le dossier patient

http://www.infectiologie.org.tn
ATB-Raisin: Antimicrobial Use Surveillance

Distribution of systemic antibiotic use in 2009, by hospital category (DDD/1000 pt-d)

http://www.infectiologie.org.tn
3. Optimise the collection and use of surveillance data

- Improve the **quality and adequacy of data collection for surveillance** of NI
  - *Objective 2008*: 100% of HCF performing surgery have organized a targeted SSI surveillance (indicator n°3).

- **Optimise the use of various sources of information**, to improve and broaden our ability to prevent and control emerging infectious risks
  - *Objective 2008*: 100% of HCF have organised a procedure for notifying alerts of sentinel events, and one person is identified as in charge of the procedure (law, art. R.6111-12 to -17).

http://www.infectiologie.org.tn
Indicator n° 3: SSI Surveillance

SURVISO: Nb of surgical subspecialties performing SSI surveillance

2008 target: 100% HCFs performing surgery have organised the follow-up of at least one procedure for each subspecialty; no HCF remains in lowest category of the indicator in 2008.

HCF performing surgery and no SSI surveillance were « penalized » in 2007 (3rd year).

http://www.infectiologie.org.tn
Crude incidence rate, 2010: 0.96% (49% deep SSI)

2 of 3 interventions
ISO-Raisin: Trends in Surgical Site Infection Rates (1)

Trends 1999 – 2005, France
Annual overall and risk-adjusted surgical site infection incidence rate for main surgical procedures, from the RAISIN database

http://www.infectiologie.org.tn
ISO-Raisin: Trends in Surgical Site Infection rates (2)

Trends 2006 – 2010 : -24% (-18% NNIS-0)
3. Optimise the collection and use of surveillance data

- Improve the quality and adequacy of data collection for surveillance of NI
  - Objective 2008: 100% of HCF performing surgery have organized a targeted SSI surveillance (indicator n°3).

- Optimize the use of various sources of information, to improve and broaden our ability to prevent and control emerging infectious risks
  - Objective 2008: 100% of HCF have organised a procedure for notifying alerts of sentinel events, and one person is identified as in charge of the procedure (law, art. R.6111-12 to -17).
The overall « aggregate » score

A simple summary indicator, directed to the public and consumers
Priority 4: Improve transfer of knowledge and information on health-care associated risk

- Towards a better information of the public
  - 2008 target: 100% of HCF describe their infection control program in an information leaflet.

- Sharing the information with patients and the public
  - 2008 target: the panel of all relevant indicators is made publicly available in 100% HCFs

http://www.icalin.sante.gouv.fr/index.php
Adapting the aggregate score to each hospital category

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<thead>
<tr>
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<th>ICALIN</th>
<th>ICSHA</th>
<th>ICATB</th>
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<td>Pub Hosp &gt;300 beds</td>
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<tr>
<td>Psychiatry</td>
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<td>Community hospitals</td>
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<td>Ambulatory care</td>
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The Aggregate Score for Public Reporting

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<td>NR</td>
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*162 excluded for Not performing SSI surveillance

http://www.infectiologie.org.tn
Disseminating the information: Displaying the indicators on the MoH website

http://www.icalin.sante.gouv.fr/
The combined indicator

Tableau de bord des Infections Nosocomiales
Résultats 2008

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94010 Creteil Cedex
Nº finesse: 940100027
Catégorie: 01-CHR-CHU

Les années suivies d'une *, les déclarations ont été validées par l'administration.

Score agréé

Score agréé du Tableau de bord des Infections Nosocomiales

<table>
<thead>
<tr>
<th>Année</th>
<th>Score agréé</th>
</tr>
</thead>
<tbody>
<tr>
<td>2006</td>
<td>96.40</td>
</tr>
<tr>
<td>2007</td>
<td>98.60</td>
</tr>
<tr>
<td>2008</td>
<td>98.60</td>
</tr>
</tbody>
</table>

Classe  

A  A  A
The 5 individual indicators

ICALIN
Indice Composite des Activités de Lutte contre les Infections Nosocomiales

<table>
<thead>
<tr>
<th></th>
<th>2006</th>
<th>2007</th>
<th>2008</th>
</tr>
</thead>
<tbody>
<tr>
<td>Score</td>
<td>98.00</td>
<td>99.00</td>
<td>99.00</td>
</tr>
<tr>
<td>Classe</td>
<td>D</td>
<td>A</td>
<td>A</td>
</tr>
</tbody>
</table>

ICALIN
Indice Composite des Activités de Lutte contre les Infections Nosocomiales

ICAIB
Indice Composite de bon usage des Antibiotiques

<table>
<thead>
<tr>
<th></th>
<th>2006</th>
<th>2007</th>
<th>2008</th>
</tr>
</thead>
<tbody>
<tr>
<td>Score</td>
<td>18.00</td>
<td>19.00</td>
<td>12.00</td>
</tr>
<tr>
<td>Classe</td>
<td>Δ</td>
<td>Δ</td>
<td>Δ</td>
</tr>
</tbody>
</table>

SUVISO
Enquête d’incidence des infections du site opératoire

<table>
<thead>
<tr>
<th></th>
<th>2006</th>
<th>2007</th>
<th>2008</th>
</tr>
</thead>
<tbody>
<tr>
<td>Réalisation de l’enquête</td>
<td>oui</td>
<td>oui</td>
<td>oui</td>
</tr>
<tr>
<td>Nombre de services participant</td>
<td>7</td>
<td>6</td>
<td>5</td>
</tr>
<tr>
<td>Nombre total de services chirurgicaux</td>
<td>7</td>
<td>6</td>
<td>5</td>
</tr>
</tbody>
</table>

ICSHA
Indicateur de Consommation de Produits Hydro Alcooliques

<table>
<thead>
<tr>
<th></th>
<th>2006</th>
<th>2007</th>
<th>2008</th>
</tr>
</thead>
<tbody>
<tr>
<td>% réalisé</td>
<td>115.20%</td>
<td>104.70%</td>
<td>145.10%</td>
</tr>
<tr>
<td>Classe</td>
<td>A</td>
<td>A</td>
<td>A</td>
</tr>
<tr>
<td>Consommation (en litres)</td>
<td>10860.00</td>
<td>9817.15</td>
<td>13567.60</td>
</tr>
<tr>
<td>Objectif personnalisé (en litres)</td>
<td>9427.70</td>
<td>9379.70</td>
<td>9379.10</td>
</tr>
</tbody>
</table>

Indice SARM
Indice SARM (calculé sur 3 ans) pour 1 000 journées d’hospitalisation

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Taux</td>
<td>-</td>
<td>0.7</td>
<td>0.58</td>
</tr>
</tbody>
</table>
Overview of HCF Ratings for the 1st generation of indicators (2005-2009)

<table>
<thead>
<tr>
<th>Indicator</th>
<th>% HCF A or B (2010)</th>
</tr>
</thead>
<tbody>
<tr>
<td>ICALIN (organisation &amp; activities)</td>
<td>92.7 %</td>
</tr>
<tr>
<td>ICSHA 2 (HH &amp; AHR)</td>
<td>72.2 %</td>
</tr>
<tr>
<td>SURVISO (SSI)</td>
<td>70.5 %</td>
</tr>
<tr>
<td>ICATB (Antibiotic use)</td>
<td>87.1 %</td>
</tr>
<tr>
<td>MRSA*</td>
<td>38.6 %</td>
</tr>
<tr>
<td>Aggregate score (ICALIN, ICSHA, SURVISO, ICATB)</td>
<td>89.7 %</td>
</tr>
</tbody>
</table>
The new 2009-2013 Plan


Trends & Perspectives

- Challenges for the 2009-2013 program:
  - Refining the hierarchy of priorities
  - Update regulations and adapt organisation and structures (IC teams, regional-based programs)
  - From NI to HCAI: Facing the challenge of HCAI in LTCFs & nursing homes,
  - Broaden the model to global patient safety and fostering a safety culture,
  - Keep the momentum for process improvement
  - Transparency and public disclosure: go further in public reporting of results with improving the first generation and more performance indicators
  - ... 
  - Focusing more on activities and results rather than structures and organisation
The 2009-2013 National Program: Priorities & Quantitative Objectives at the national level (results)

- **Priority 1: Reduce rates of device-associated infections**
  1. The incidence of *CVC-related bacteremias in ICUs* should be reduced by 25% (ref REA-RAISIN 2008)
  2. The incidence of *SSI* per 100 low-risk procedures (scheduled surgery) should decrease by 25% (ref ISO-RAISIN 2008)
  3. The incidence of *needle/sharp injuries* per 100 admissions should decrease by 25%, overall and in each hospital category

- **Priority 2: Control the dissemination of MDRB and of emerging new resistance markers at risk of epidemics**
  4. The incidence of *MRSA* per 1000 HD should decrease by 25%, including the rate of *MRSA BSI* (ref BMR-RAISIN 2008)
  5. The proportion of *GRE* among *E. faecium* remains at <1% at the national level.

http://www.infectiologie.org.tn
REA-Raisin: Surveillance of ICU-Acquired Infections (1)

- 2010 Data
  - 181 wards
  - 2,030 ICU beds (37% of all adult ICU beds in France)
  - 25,685 patients hospitalised > 2 days

<table>
<thead>
<tr>
<th>Invasive device</th>
<th>% patients exposed</th>
<th>Duration Exposure, mean (med.) days</th>
<th>Exposition ratio (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>ET Intubation</td>
<td>64.5</td>
<td>10.9 (6)</td>
<td>60.8</td>
</tr>
<tr>
<td>Central VC</td>
<td>63.3</td>
<td>12.2 (8)</td>
<td>66.0</td>
</tr>
<tr>
<td>Urinary cath.</td>
<td>87.0</td>
<td>11.3 (7)</td>
<td>84.2</td>
</tr>
</tbody>
</table>
REA-Raisin: Surveillance of ICU-Acquired Infections (2)

- Incidence of CVC-related BSI (0 in 120 /181 ICUs (66%))

![Graph showing incidence of CVC-related BSI](http://www.infectiologie.org.tn)

- Median: 0.5
- Min: 0.0
- P25: 0.0
- Méd: 0.0
- P75: 0.8
- Outlier: 1.9
- Max: 11.0

http://www.infectiologie.org.tn
REA-Raisin: Surveillance of ICU-Acquired Infections (3)

- Catheter-related BSI incidence, 2008 to 2010
  - P75: 1.23 → 1.40 → 0.77 for 1000 CVC days
  - i.e., −37.4% in 3 years

- En 2012, le taux d'incidence des bactériémies associées aux cathéters veineux centraux (CVC) en réanimation pour 1000 jours d'exposition aux CVC a diminué d'un quart ; [données de référence : REA RAISIN 2008]
The « bundle » approach

An Intervention to Decrease Catheter-Related Bloodstream Infections in the ICU

Peter Pronovost, M.D., Ph.D., Dale Needham, M.D., Ph.D., Sean Berenholtz, M.D., David Sinopoli, M.P.H., M.B.A., Haitao Chu, M.D., Ph.D., Sara Cosgrove, M.D., Bryan Sexton, Ph.D., Robert Hyzy, M.D., Robert Welsh, M.D., Gary Roth, M.D., Joseph Bander, M.D., John Kepros, M.D., and Christine Goeschel, R.N., M.P.A.

- 103 ICUs (Michigan)
- 375,757 catheter-days.
- Intervention focused on 5 evidence-based interventions (CDC)
  - Having substantial impact on infection rates
  - And the least barriers to implementation.
- Including :
  - Hand hygiene,
  - Maximal barrier precaution at insertion,
  - Skin disinfection with chlorhexidine,
  - Avoiding the femoral site
  - Catheter removal asap.
- Local team leaders (physician + nurse) in each unit


http://www.infectiologie.org.tn
Controlling Catheter-related Infections


http://www.infectiologie.org.tn
Objectifs quantifiés de résultats

- **En 2012,** le taux d’incidence* des SARM isolés de prélèvements cliniques pour 1 000 journées d’hospitalisation a diminué d’un quart, y compris pour les bactériémies à SARM [données de référence : BMR RAISIN 2008]

- **En 2012,** la proportion de souches d’Enterococcus faecium résistants aux glycopeptides reste inférieure à 1% au niveau national [référence : réseau EARSS-France]

* la valeur cible utilisée est le troisième interquartile de la distribution des taux (P75, qui reflète la valeur maximale de 75% de l’ensemble des taux observés dans le réseau), dont on attend qu’elle tende vers le taux médian (valeur maximale observée pour 50% des taux) observés avant la période du programme 2009-2012.
National Programme 2009-13: Processes & activities objectives at the HCF level

- **By 2013**, 100% of HCF routinely use **checklist** as an incentive to complicity to preventive measures during insertion and care of:
  - CVC in ICUs
  - *peripheraly-inserted iv catheters* and *urinary catheters*
  - And in the *operatiing room*

- **By 2013**, 100% HCFs use **root cause analysis** methods for assessing serious infectious events

- **By 2012**, 100% HCFs have implemented routine auditing practices of HCW for prevention of the infection risk

- **By 2013**, 95% HCFs have implemented **SSI surveillance** through integration into their **information system**.

http://www.infectiologie.org.tn
By 2013, All HCFs have reached 70% of the target objective for consumption of AHR products

By 2013, All HCFs have established a programme for control of MDRB, tailored to their activity

By 2013, All HCFs have implemented the routine reassessment of antibiotic therapy at 24-72h as part of their antibiotic stewardship program and assess the adherence to this process

By 2013, All HCFs have an established and operationnal procedure for in-house and externalised alerts

By 2013, All HCFs have established an operationnal plan for rapid response in case of emerging disease posing a high epidemic risk.
By 2013, All HCFs have an operational procedure, in conjunction with the occupational medicine services, for surveillance and management of BBFE in personnel.

By 2013, All HCFs have organised and implemented, in conjunction with the occupational medicine services, the monitoring of HCW vaccination status against, influenza, measles, and HBV.

By 2013, All HCFs have an adequately staffed infection control team, according to national specifications.

By 2013, All references and affiliated centers participating to the management of complicated bone-joint infections have evaluated the satisfaction of patients treated at their institution.
Mandatory annual report by HCFs


- Second generation of indicators:
  - ICALIN2
  - ICALISO
  - ICABMR
National Indicator N°5: MRSA Incidence

- A much controversial indicator
- First released in 2008
- Reflecting both input and output of MRSA cases (imported/acquired)
- Difficult to adapt to all categories of HCF (sample size)
- Sensitive to case-mix
- Reported as the 3-yr average incidence (p.1000 pt-days) of MRSA cases (clinical samples)
- Grouped per hospital category
- Evolving to trends over time for a given HCF (targeted 25% reduction)
National Indicator N°5: MRSA Incidence 2005-2007 (1023 HCFs)

Median of 3-yr Incidence of MRSA clinical isolates, p./1000 pt-days

<table>
<thead>
<tr>
<th>Location</th>
<th>Median</th>
<th>Max</th>
<th>Min</th>
</tr>
</thead>
<tbody>
<tr>
<td>CHR-CHU</td>
<td>0.56</td>
<td></td>
<td></td>
</tr>
<tr>
<td>CH&lt;300</td>
<td>0.51</td>
<td></td>
<td></td>
</tr>
<tr>
<td>CH&gt;300</td>
<td>0.56</td>
<td></td>
<td></td>
</tr>
<tr>
<td>HL</td>
<td>0.21</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ClinMCO</td>
<td>0.37</td>
<td></td>
<td></td>
</tr>
<tr>
<td>SSR-SLD</td>
<td>0.2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>CLCC</td>
<td>0.58</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Within the period 2005 - 2008, the incidence of MRSA has decreased by 25% in at least 75% HCFs.

http://www.infectiologie.org.tn
Distribution of HCF according to changes in MRSA rates, 2005-2010

Per cent facilities with increasing/declining MRSA rates

- CHRU: 69%
- CH <300: 31.3%
- CH >300: 53.4%
- Private: 26.7%
- LTC: 31.3%
- CCC: 69%

MRSA rates increased in 4.2% of facilities, decreased in 14.4% of facilities.
Trends in MRSA, Paris University Hospitals Group (AP-HP)

MRSA proportion among S. aureus, and MRSA incidence, 39 teaching hospitals of the Paris area, 1993 to 2007

% MRSA among S. aureus
- Incidence for 100 admissions
- Incidence for 1,000 patient days

Start of ABHRS campaign


Year

Eurosurveillance, 2008; 13 (46): 4-9

www.eurosurveillance.org

http://www.infectiologie.org.tn

Prevalences compared in 1 351 healthcare facilities participating in both surveys.

Overall MRSA prevalence: 0.49% to 0.29% (-41%)
Multivariate analysis: ORa=0.60
EARSS 2008: MRSA invasive isolates
### BMR-Raisin: MDR Bacteria Surveillance

(1)

<table>
<thead>
<tr>
<th>Region</th>
<th>2008</th>
<th>2009</th>
<th>2010</th>
<th>Trend (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nord (wo. APHP)</td>
<td>0.54</td>
<td>0.51</td>
<td>0.49</td>
<td>-9.3</td>
</tr>
<tr>
<td>Nord (APHP)</td>
<td>0.51</td>
<td>0.44</td>
<td>0.41</td>
<td>-19.6</td>
</tr>
<tr>
<td>Est</td>
<td>0.43</td>
<td>0.38</td>
<td>0.41</td>
<td>-4.7</td>
</tr>
<tr>
<td>Ouest</td>
<td>0.33</td>
<td>0.31</td>
<td>0.30</td>
<td>-9.1</td>
</tr>
<tr>
<td>Sud-Est</td>
<td>0.42</td>
<td>0.38</td>
<td>0.42</td>
<td>0.0</td>
</tr>
<tr>
<td>Sud-Ouest</td>
<td>0.51</td>
<td>0.48</td>
<td>0.46</td>
<td>-9.8</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>0.45</strong></td>
<td><strong>0.41</strong></td>
<td><strong>0.41</strong></td>
<td><strong>-8.9</strong></td>
</tr>
</tbody>
</table>

| Healthcare facilities, n | 930 | 929 | 933 |

MRSA Incidence p. 1000 patient-days, 2010

http://www.infectiologie.org.tn
BMR-Raisin: MDR Bacteria Surveillance (3)


Incidence / 1000 JH (cohorte 312 ES)

http://www.infectiologie.org.tn
**EARS-Net: MDR Bacteria Surveillance in Europe**

<table>
<thead>
<tr>
<th>Country</th>
<th>Year</th>
<th>Antibiotic Group</th>
<th>S</th>
<th>I</th>
<th>R</th>
<th>Total N</th>
<th>%S</th>
<th>%I</th>
<th>%R</th>
</tr>
</thead>
<tbody>
<tr>
<td>France (123)</td>
<td>2002</td>
<td>Vancomycin</td>
<td>121</td>
<td>0</td>
<td>2</td>
<td>123</td>
<td>98.37 %</td>
<td>0.00 %</td>
<td>1.63 %</td>
</tr>
<tr>
<td>France (123)</td>
<td>2003</td>
<td>Vancomycin</td>
<td>123</td>
<td>0</td>
<td>0</td>
<td>123</td>
<td>100.00 %</td>
<td>0.00 %</td>
<td>0.00 %</td>
</tr>
<tr>
<td>France (161)</td>
<td>2004</td>
<td>Vancomycin</td>
<td>151</td>
<td>2</td>
<td>8</td>
<td>161</td>
<td>93.79 %</td>
<td>1.24 %</td>
<td>4.97 %</td>
</tr>
<tr>
<td>France (194)</td>
<td>2005</td>
<td>Vancomycin</td>
<td>189</td>
<td>0</td>
<td>5</td>
<td>194</td>
<td>97.42 %</td>
<td>0.00 %</td>
<td>2.58 %</td>
</tr>
<tr>
<td>France (221)</td>
<td>2006</td>
<td>Vancomycin</td>
<td>214</td>
<td>0</td>
<td>7</td>
<td>221</td>
<td>96.83 %</td>
<td>0.00 %</td>
<td>3.17 %</td>
</tr>
<tr>
<td>France (322)</td>
<td>2007</td>
<td>Vancomycin</td>
<td>318</td>
<td>0</td>
<td>4</td>
<td>322</td>
<td>98.76 %</td>
<td>0.00 %</td>
<td>1.24 %</td>
</tr>
<tr>
<td>France (353)</td>
<td>2008</td>
<td>Vancomycin</td>
<td>350</td>
<td>1</td>
<td>2</td>
<td>353</td>
<td>99.15 %</td>
<td>0.28 %</td>
<td>0.57 %</td>
</tr>
<tr>
<td>France (591)</td>
<td>2009</td>
<td>Vancomycin</td>
<td>586</td>
<td>0</td>
<td>5</td>
<td>591</td>
<td>99.15 %</td>
<td>0.00 %</td>
<td>0.85 %</td>
</tr>
</tbody>
</table>

*E. faecium*

- **En 2012**, la proportion de souches d’*Enterococcus faecium* résistants aux glycopeptides reste inférieure à 1% au niveau national [référence : réseau EARSS-France]
Enterococcus faecium: Vancomycin-Resistant isolates, France, 2002 – 2010

National Action Plan for Controlling VRE

Source: ECDC / EARS-Net 2010
Early Warning & Response System (EWARS): Tracking Emerging Threats

Tracking the Emergence of Carbapenemase-producing *Enterobacteriaceae* in France
National HAI Early Warning and Response System, France

(Signalement des infections nosocomiales)
National, HAI/AMR Early Warning and Response System, France (1)

- Law regulation (26/07/2001)
- Mandatory notification of some HAI: **emerging, severe, epidemic**
  - Rare or severe infection, based on the characteristics of the pathogen, its resistance phenotype, or the infection site
  - Associated with a contaminated product or device / specific practices / environment
  - Death associated with a HAI
  - Otherwise notifiable infectious diseases acquired in the hospital
- Objectives: assistance to healthcare facilities in investigation and control, detection, feedback of experience

http://www.infectiologie.org.tn
Notification Form (Paper, 2001 to 2011)

Fiche de signalement des infections Nosocomiales (version 2011)
à transmettre sans délai à l’ARS et au CIClin dont dépend votre établissement

Données administratives
- Etablissement:
- Code de l’Etablissement:
- Adresse:
- Code postal:
- Ville:
- Statut:
- Type:
- Praticiens en hygiène:
- Praticien d’entretien:
- Fonction:
- Tel:
- Fax:
- Courriel:

Critères de signalement (à cocher obligatoirement, une ou plusieurs cases)
1. Infection nosocomiale ayant un caractère rare ou particulier du fait :
   - [ ] a. De l’agent pathogène en cause (nature, caractéristiques ou profil de résistance)
   - [ ] b. De l’endroit d’inoculation
   - [ ] c. De première survenue d’un établissement (en brève description de l’EODMR)
   - [ ] d. De la localisation de l’infection
   - [ ] e. Survenu au cours de la première survenue à l’établissement

2. Description de l’événement

<table>
<thead>
<tr>
<th>Description de l’événement</th>
<th>Nombre de cas</th>
<th>Décès</th>
<th>Circonstance de décès</th>
</tr>
</thead>
</table>

3. Actions d’amélioration

- [ ] a. État des lieux
- [ ] b. Études de l’épidémie

4. Informations complémentaires (si tout document utile, établi par l’établissement et rendu anonyme)

http://www.infectiologie.org.tn
http://www.infectiologie.org.tn
Information Flow (1)

NRC: National Reference Centres
ARS: Regional Health Authorities
CClin / Arlin: Regional Infection Control Coordinating Centres

http://www.infectiologie.org.tn
Context

- **Enterobacteriaceae**
  - Increasingly resistant to antibiotics
  - Carbapenems: last-line therapy against strains producing extended-spectrum beta-lactamases.

- **Carbapenemase-producing Enterobacteriaceae (CPE)**
  - Resistance to carbapenems
  - Various types
  - Increasingly reported worldwide
  - Last step towards a therapeutic dead end
E. coli and K. pneumoniae: proportion of carbapenem resistant isolates from patients with invasive infections, 2009

Carbapenem resistant E. Coli isolates, 2009

<1%

Carbapenem resistant K. pneumoniae isolates, 2009

<1%

Source: European Antimicrobial Resistance Surveillance Network (EARS-Net).
Carbapenem-resistant *K. pneumoniae*, 2010

**Figure 5.25: Klebsiella pneumoniae: proportion of invasive isolates resistant to carbapenems in 2010**

- ≤ 1%
- 1% to < 5%
- 5% to < 10%
- 10% to < 25%
- 25% to < 50%
- ≥ 50%
- No data reported or less than 10 isolates
- Not Included

http://www.infectiologie.org.tn
Notifications EPC to the NIPH (InVS), by January 2012
Bacterial species involved in reported CPE episodes (N=104)

<table>
<thead>
<tr>
<th>Bacterial species</th>
<th>Number of episodes</th>
<th>N</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td><em>2 or 3 enterobacteriaceae with the same carbapenemase involved in 9 episodes</em></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Klebsiella pneumoniae</td>
<td>67</td>
<td>59</td>
<td></td>
</tr>
<tr>
<td>Escherichia coli</td>
<td>25</td>
<td>22</td>
<td></td>
</tr>
<tr>
<td>Enterobacter cloacae</td>
<td>14</td>
<td>12</td>
<td></td>
</tr>
<tr>
<td>Enterobacter aerogenes</td>
<td>3</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Citrobacter freundii</td>
<td>3</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Proteus mirabilis</td>
<td>1</td>
<td>&lt;1</td>
<td></td>
</tr>
<tr>
<td>Serratia marcescens</td>
<td>1</td>
<td>&lt;1</td>
<td></td>
</tr>
<tr>
<td>Providencia stuartii</td>
<td>1</td>
<td>&lt;1</td>
<td></td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>115</strong></td>
<td><strong>100</strong></td>
<td></td>
</tr>
</tbody>
</table>
Epidemiological characteristics of CPE episodes (N=104)

• 249 cases identified
  – Infected: 68 (29%)
  – Colonised: 170 (71%)

• 1 to 44 cases by episode

• Secondary cases: 22 episodes (21%)
  For these episodes:
  – Mean number of cases: 8 cases
  – Median number of cases: 3 cases

• 2 episodes with co-index cases

• Deaths: 51
  – Crude lethality rate (all infected / colonised cases): 20%

http://www.infectiologie.org.tn
Episodes associated with cross-border transfer within the past year (N=76)

- 73% of all episodes

<table>
<thead>
<tr>
<th>Context</th>
<th>Number of episodes</th>
<th>(%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Direct transfer from a foreign hospital</td>
<td>50</td>
<td>(66%)</td>
</tr>
<tr>
<td>Hospitalisation in a foreign hospital</td>
<td>13</td>
<td>(17%)</td>
</tr>
<tr>
<td>Resident in France, travel abroad without reported hospitalisation</td>
<td>7</td>
<td>(9%)</td>
</tr>
<tr>
<td>Resident abroad without reported hospitalisation</td>
<td>6</td>
<td>(8%)</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>76</strong></td>
<td>(100%)</td>
</tr>
</tbody>
</table>
Carbapenemase type, by country where index cases had been hospitalised or stayed abroad (N=76)

<table>
<thead>
<tr>
<th>Country</th>
<th>KPC</th>
<th>OXA-48</th>
<th>VIM</th>
<th>NDM-1</th>
<th>Total</th>
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</thead>
<tbody>
<tr>
<td>Greece</td>
<td>16</td>
<td>2007</td>
<td>4</td>
<td>2004</td>
<td>19*</td>
</tr>
<tr>
<td>Morocco</td>
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<td>2010</td>
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<td>2011</td>
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<tr>
<td>Total</td>
<td>27</td>
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</tbody>
</table>

*a two carbapenemases involved in a same episode*
Carbapenemase type, by country where index cases had been hospitalised or stayed abroad (N=76)

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<td></td>
<td>1</td>
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</tr>
</tbody>
</table>

Total: 27 cases involving 2 carbapenemases involved in a same episode

*a two carbapenemases involved in a same episode

http://www.infectiologie.org.tn
Carbapenemase type, by country where index cases had been hospitalised or stayed abroad (N=76)

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</tr>
<tr>
<td><strong>Total</strong></td>
<td>27a</td>
<td></td>
<td>33</td>
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<td>11</td>
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</tbody>
</table>
Episodes without cross-border transfer and carbapenemases involved (N=28)

<table>
<thead>
<tr>
<th>KPC</th>
<th>OXA-48</th>
<th>VIM</th>
<th>NDM-1</th>
<th>IMI</th>
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<td>21</td>
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<td>2</td>
<td>3</td>
<td>1</td>
<td>1</td>
<td>28a</td>
</tr>
</tbody>
</table>

- 27% of all episodes without known cross-border transfer
  - 75% involved OXA-48.
  - occurred in 4 regions, 12 French départements
- Suggesting the emergence of indigenous circulation of OXA-48 CPE in France

*a two different carbapenemases involved for one episode*
Recommendations for patients repatriated or with a history of hospitalization abroad

- Patients repatriated or with a history of hospitalization abroad
  - Implementation of contact precautions for this patients
  - Screening of patients
  - Immediate notification to regional Health authorities and CClin
  - Laboratory confirmation of the carbapenemase

- CPE Confirmed case
  - Reinforcement of contact and standard precautions
    - Contact tracing, cohorting of patients into three distincts sectors (one for cases, one for contact patients and one for new-admited CPE – free patients)


- Circulaire (6 décembre 2010).
Conclusion

- CPE episodes are an emerging problem in France
- significantly increased number during the past 3 years
- Most episodes are related with cross-border transfer
  - Awareness of the risk of spreading MDRB via cross-border transfer of patients
  - Rapid identification of CPE by screening potential carriers among patients transferred from hospitals of countries with high CPE prevalence
  - Implementing preemptive isolation & adequate control measures
  - Reinforcing appropriate control measures in areas where CPE are endemic
- Emergence of an indigenous circulation of OXA-48
  - Sustained vigilance needed when carbapenem resistance is suspected in Enterobacteriaceae isolated from any patient
Acknowledgments

To the many contributors to the achievements of the French national Infection control program, whether individuals and organizations, among which:

- The Infection Control bureau of the Quality & Safety division at the MoH
  - Drs V. Salomon, L. May-Michelangeli, V. Drouvot

- The Inter-regional IC Coordinating Centers (CCLINs) and RAISIN networks
  - Drs P. Astagneau, J Fabry, B. Lejeune, C. Rabaud, P. Parneix, A. Savey, V Jarlier, A Carbonne, P Jarno, D. Talon, C. Dumarttin

- The Infectious Diseases division at the National Institute for Public Health Surveillance (InVS)
  - Drs JC Desenclos & B. Coignard

- The Patients’ Safety Commission at the Council for Public Health (HCSP)
  - Drs J. Carlet, G. Beaucaire & B. Grandbastien

- Members of the Advisory Board for the National Infection Control Program

- Steering committee for NI Indicators
  - Drs P. Parneix, JC Lucet & B. Grandbastien

- Consumers’ associations
  - AM Ceretti, C Rambaud

- And to the thousands IC teams contributing to improving infection control and patients’ safety within HCFs
Conclusions

- Facing the problem of HCA infection in France:
  - A 30 years history of development,
  - A finely tuned multilevel integrated organization,
  - A strong implication of IC professionals,

- A national public health challenge addressed:
  - A genuine political concern and support,
  - An important role of consumers’ claims,
  - A comprehensive legislation.
Conclusions (2)

- The role of publicly available indicators
  - A strong incentive for HCFs,
  - A “booster” effect, inciting ICTs to reach highest marks
  - A field taken as exemplary for the development of patients’ safety actions in France

- Consumers and Public
  - Well taken up by the press
  - Not much yet by patients:
    - Interpretation not straightforward
    - Other considerations may predominate
    - Research on behavioural changes needed

http://www.infectiologie.org.tn