Notification and early warning: the French mandatory system illustrated by the *Clostridium difficile* infection outbreak

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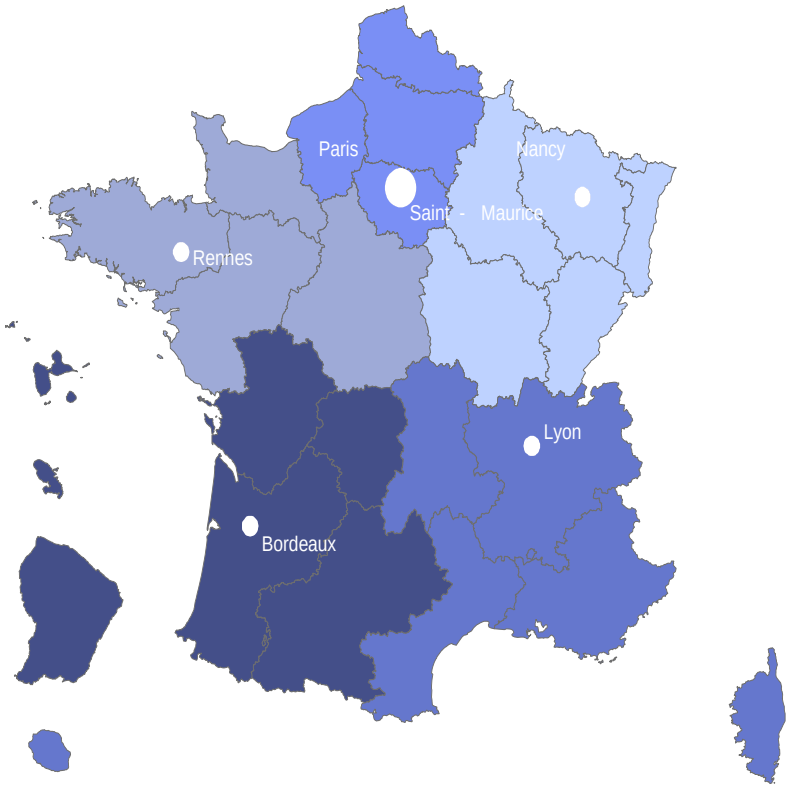
Background: Hospital and Infection Control, France



- 64 millions inhabitants
- 2, 800 healthcare facilities (HCF) including acute care, rehabilitation and long term facilities
- 94% with infection control units (2008)
- 450,000 beds
- 26 Regional Health Agency (ARS)
- 5 Regional Infection Control Coordinating Centers (CClin)
- National Early Warning Investigation and Surveillance Network (Raisin) coordinated by French Institute for public health surveillance (InVS)

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Healthcare Associated Infection (HAI) Notification: Objectives

- To detect unusual events

  at local, regional or national level
- To promote outbreak investigations and control
- To develop (or reinforce existing)

  national infection control (IC) recommendations

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HAI Notification: Principles

System operational since August, 2001

- All HCF in France have to declare unusual (rare or severe) HAI
- Notifications of events based on 4 selected criteria:
  - Rare or unusual HAI
    - Microorganisms characteristics, including resistance
    - Infection site, associated devices or practices
  - Patient death due to HAI
  - Airborne or waterborne infection
  - Otherwise mandatory notifiable infection (e.g., *Legionella*)

- Notification decided by the IC practitioner, based on his/her knowledge and expertise

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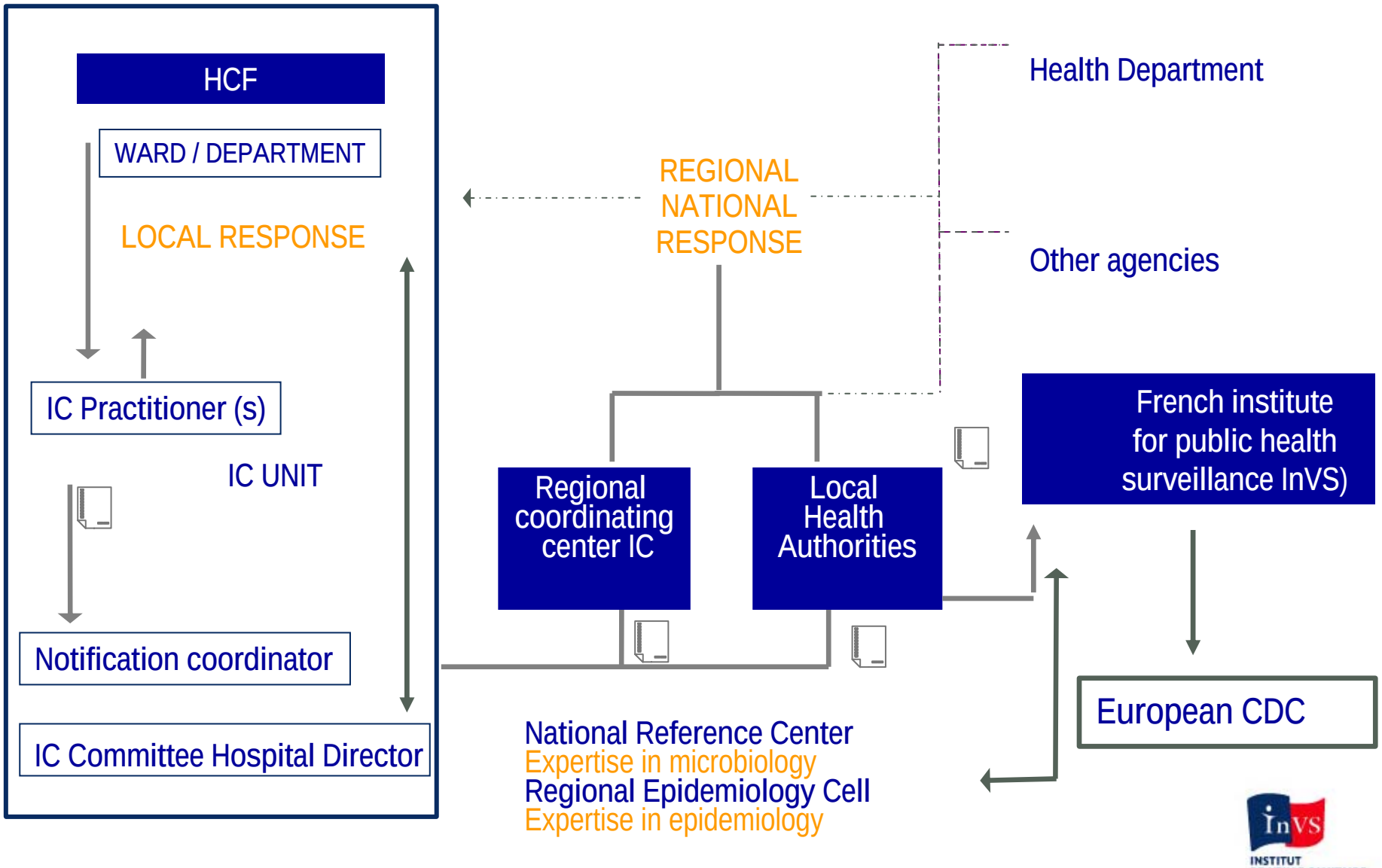
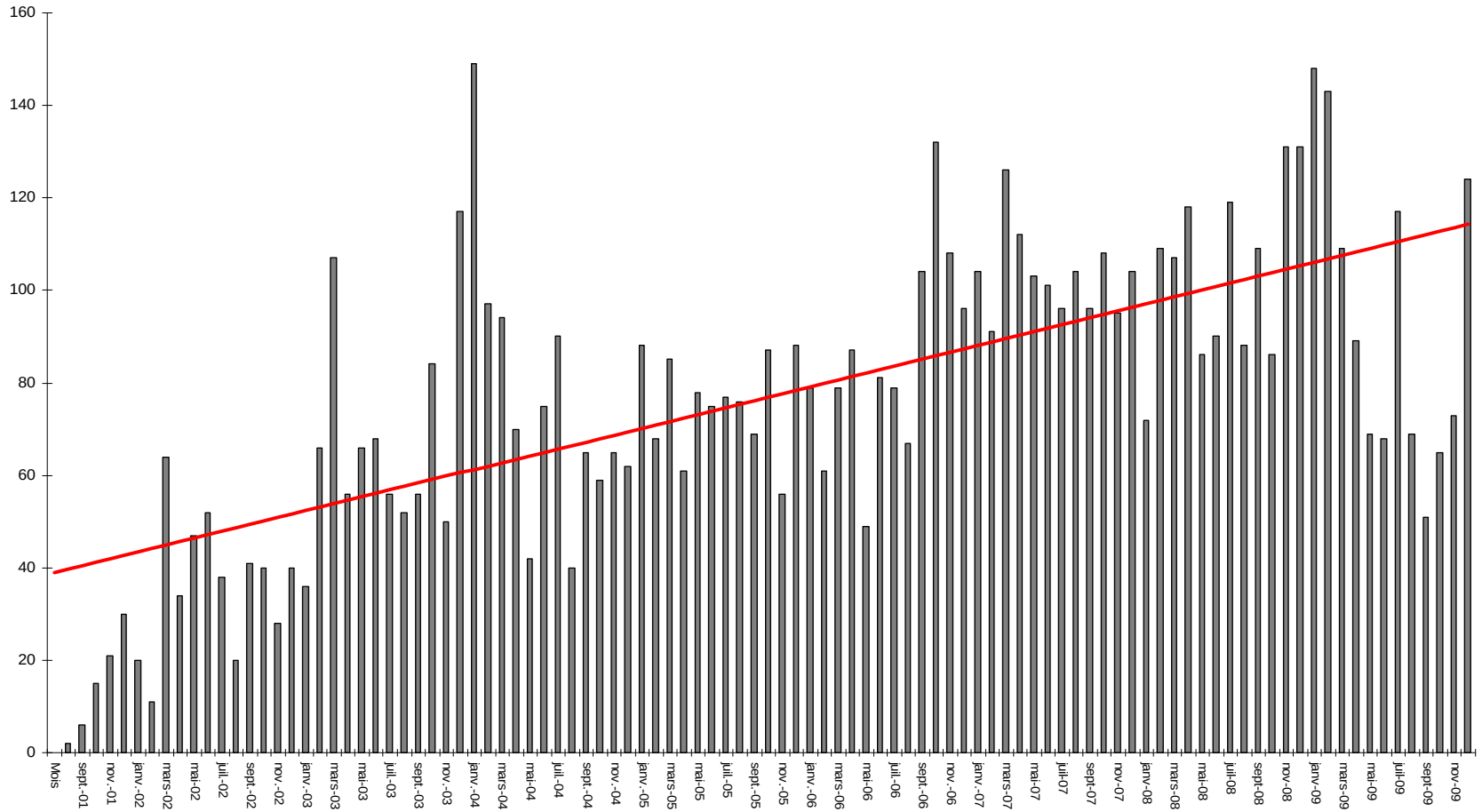
HAI Notification : Information Flow



HAI Notifications by Month, France, 2001–2009(N= 7,838)



Moving average

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Quantitative Aspects

From 08/01/2001 to 12/31/2009

Notifications (N)	7,838
Notifying hospitals (N)	1,351 (48%)
Infected patients (N)	27,753
- clusters	2,361(30%)
- local investigations	4,374 (56%)
- assistance requested	604 (8%)

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National (and European) Alerts

- 09/2003: VEB-1 ESBL-producing *A. baumannii* (➲ EWRS)
- 06/2004: endophtalmitis & use of a xylocaïne gel
- 06/2004: Imipenem-resistant *Klebsiella pneumoniae* (➲ EWRS)
- 12/2004: *Enterobacter sakazakii* associated with powdered infant formula (➲ EWRS)
- 07/2005: glycopeptide-resistant *Enterococci*
- 09/2006: *Clusters of Clostridium difficile infections with 027 strains* (➲ EWRS)

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C. difficile 027, France

- Epidemic intelligence phase
  - to assess the situation
- State of preparedness
  - to identify the resources
  - to anticipate the measures
- Alert period
  - to investigate the outbreaks
  - to manage the episode
- Follow-up phase
  - to monitor the spread of the strain 027
  - to assess the efficacy of the control measures

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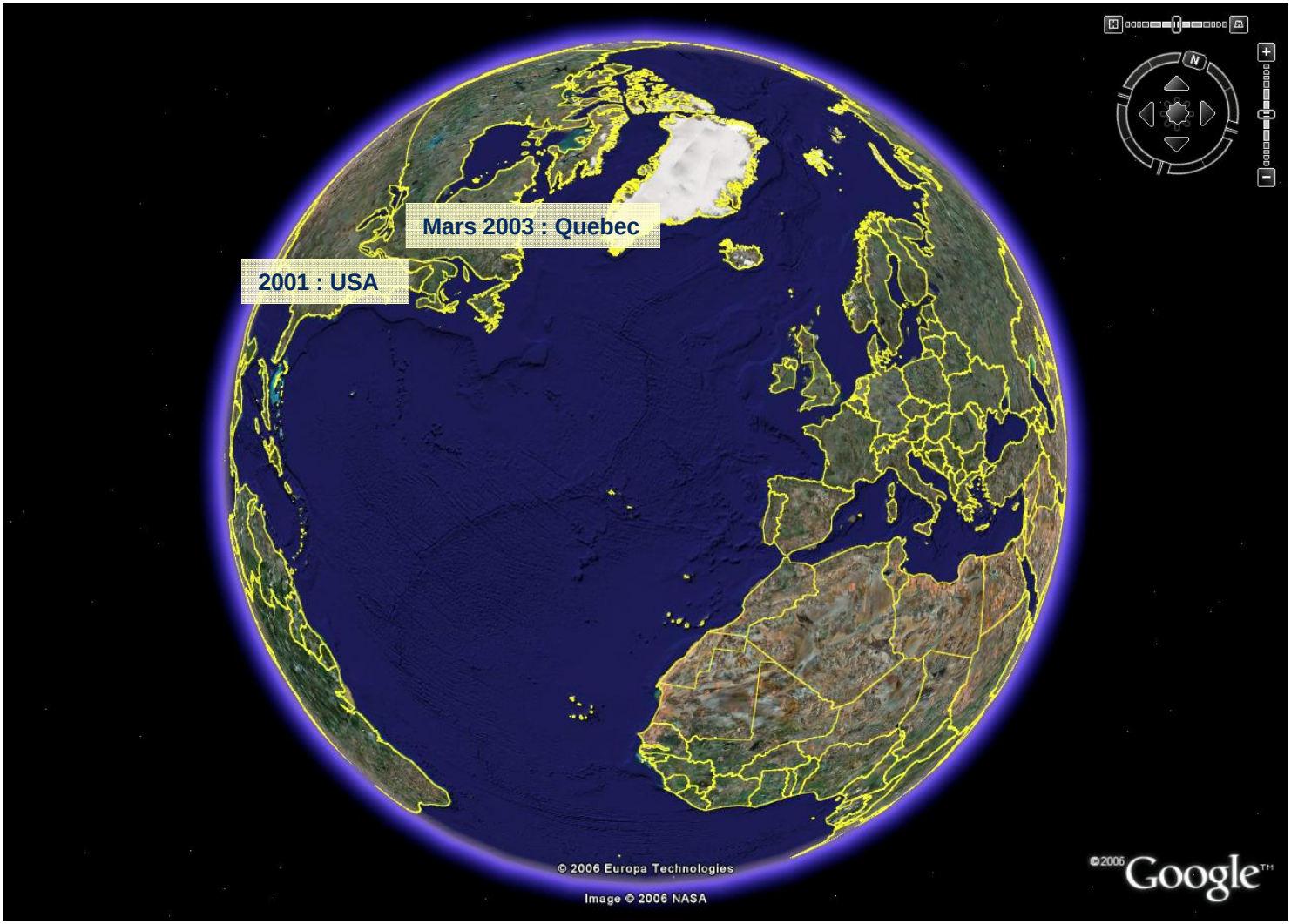
Clostridium difficile, PCR-ribotype 027, emergence



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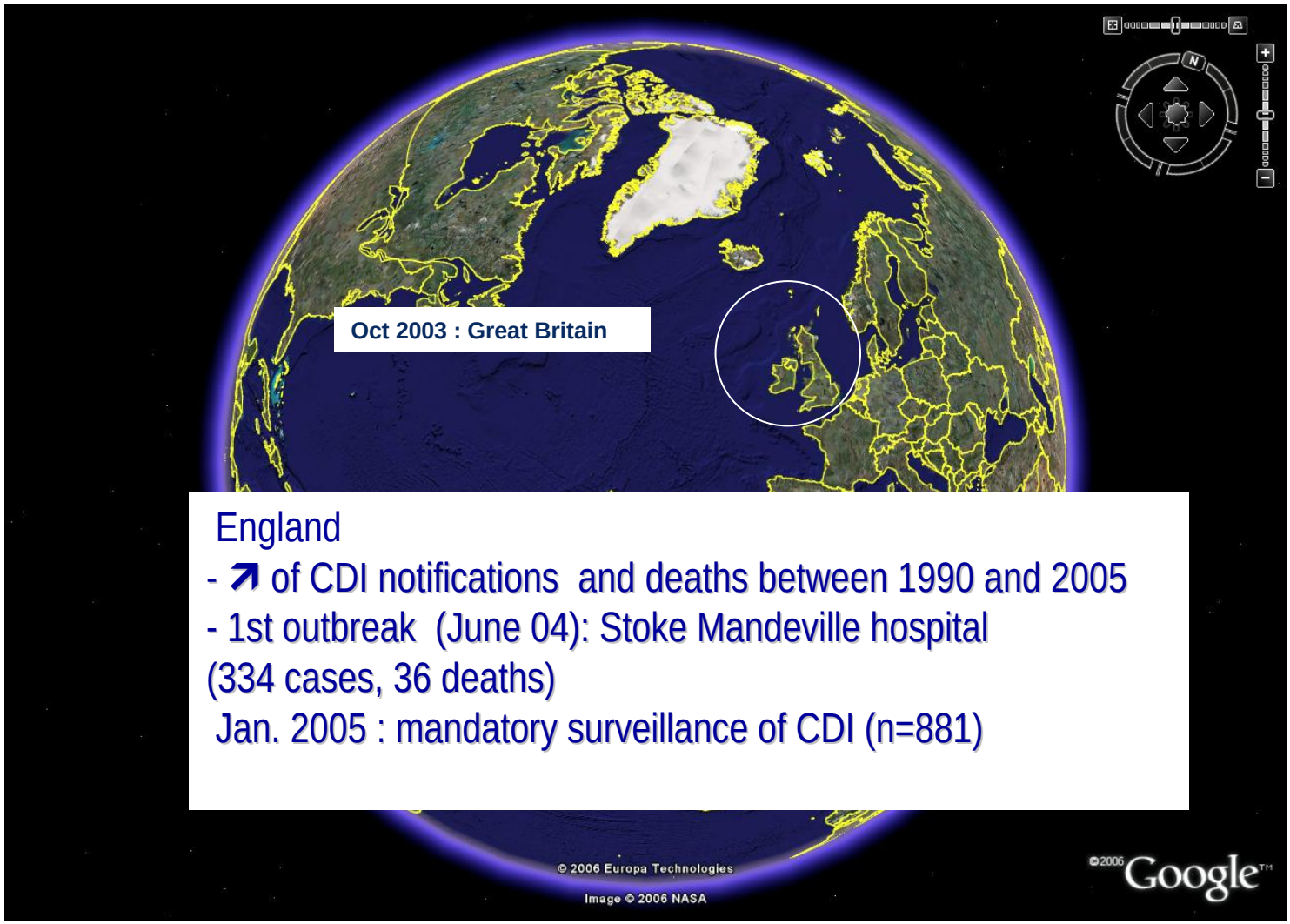
Clostridium difficile, PCR-ribotype 027, Focus in England



England

- ↗ of CDI notifications and deaths between 1990 and 2005
- 1st outbreak (June 04): Stoke Mandeville hospital (334 cases, 36 deaths)

Jan. 2005 : mandatory surveillance of CDI (n=881)

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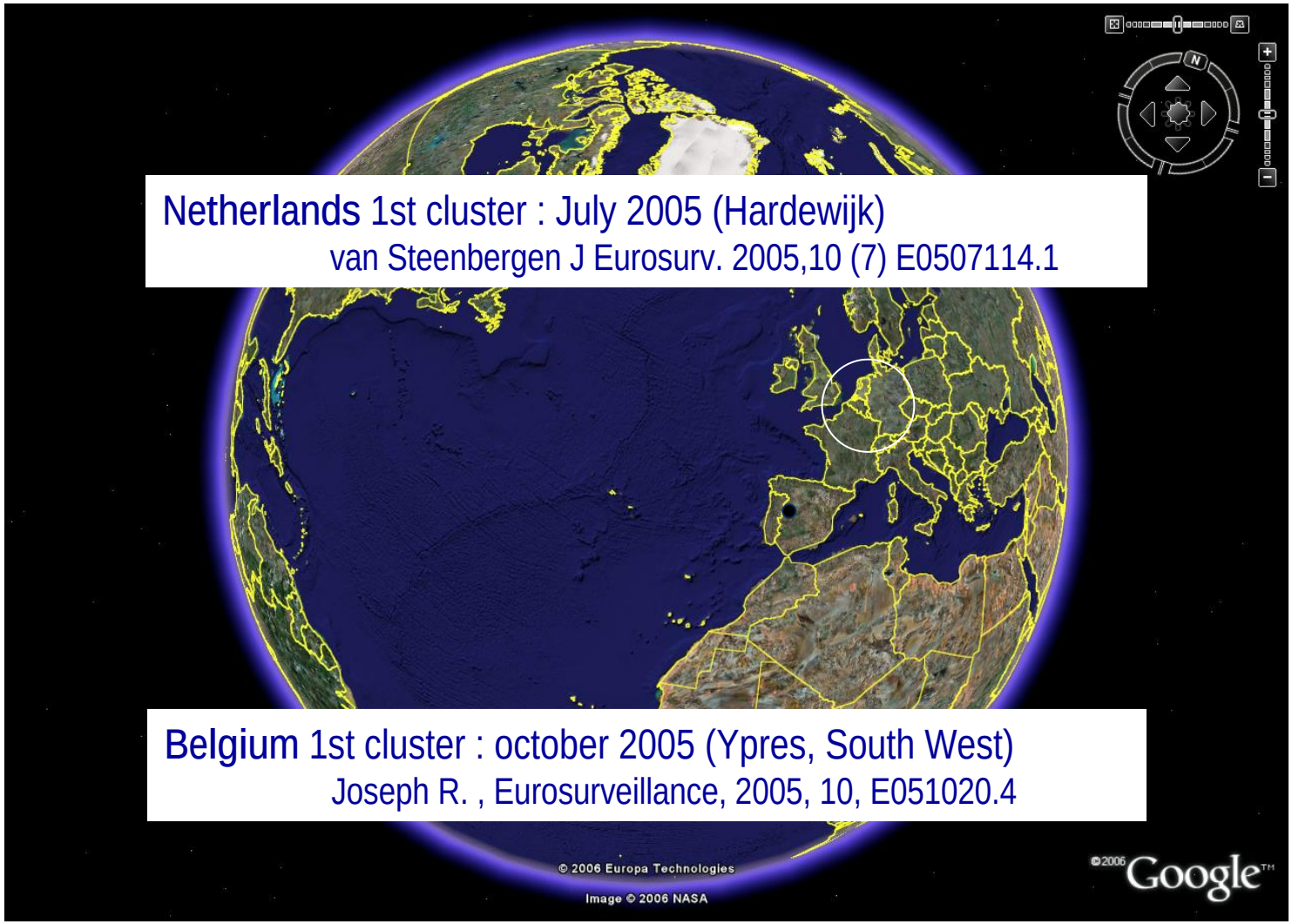
Clostridium difficile, PCR-ribotype 027, Focus in Netherlands, Belgium



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C. difficile 027, France, 2001 – 2005

- Data on the epidemiology of CDI between 2001 and 2005 were scarce:
  - No guideline for CDI notification
  - No systematic typing of strains
    - First case of 027 strain described in 1988 (Strain CD196)
    - Susceptible to ERY and MXF (« historical clone »)
  - HAI early warning is based on mandatory notification of outbreaks of HAI and deaths related to HAI
  - 2001-2005: n=33 notifications of CDI from 16 different geographic areas :
    - 18 sporadic cases
    - 15 outbreaks
    - 027?

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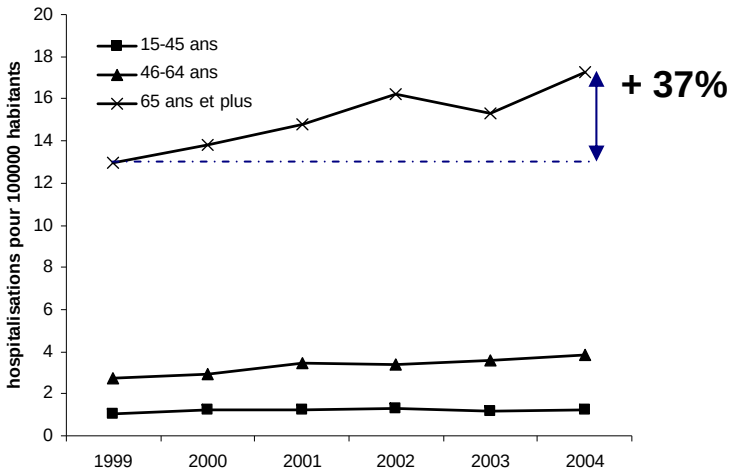
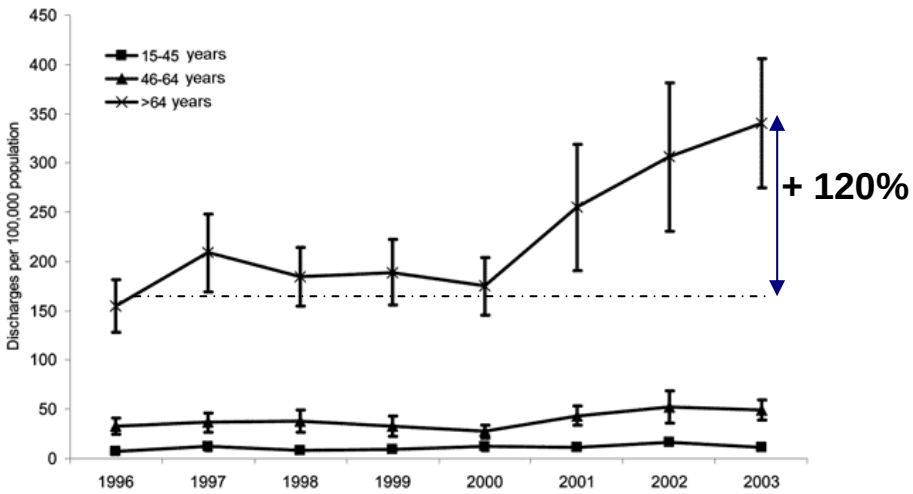
Hospitalisations with *C. difficile* Infections, France, 1999 – 2004



Lambert J, Coignard B. InVS 2006 (non publié)



McDonald LC et al, *Emerg Infect Dis* 2006

- CIM10 A04.7
- Administrative data (PMSI)

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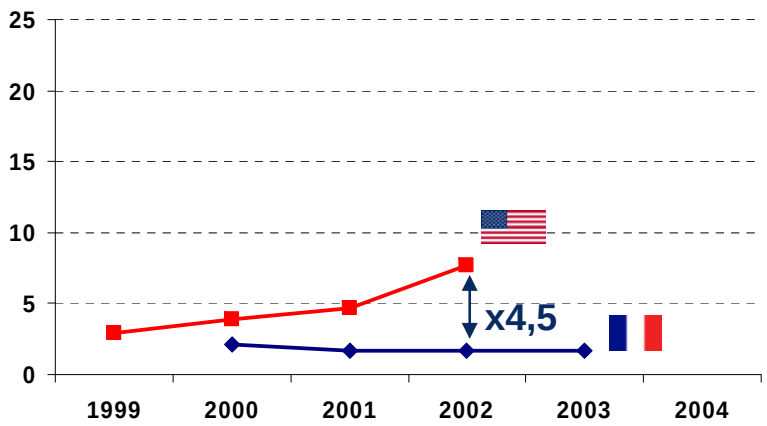
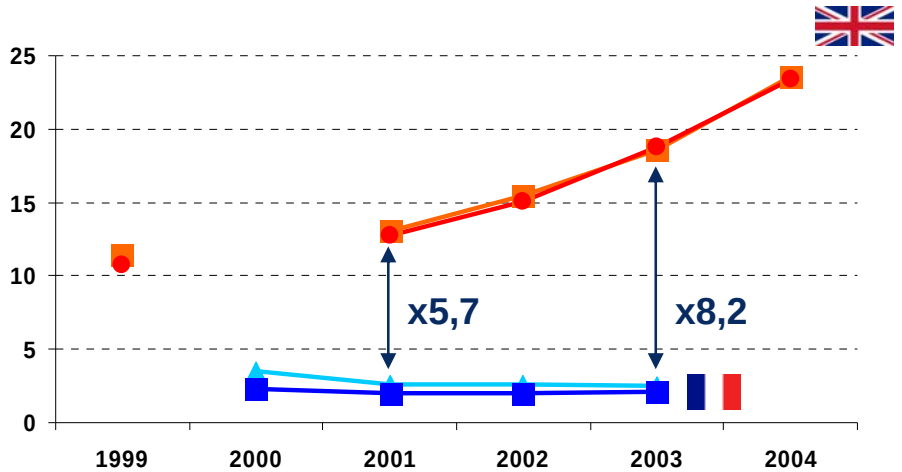
Deaths associated with *C. difficile* infections, France, 2000 – 2003



- Death certificates data (CepiDC)
- CIM10 A04.7 as a direct cause
- Deaths per 1,000,000 inhabitants
- Direct standardisation (US census, 2000)



- Death certificates data (CepiDC)
- CIM10 A04.7 as a direct / contributive cause
- Deaths per 1,000,000 inhabitants, by gender
- Direct standardisation (EU standard population, WHO)

Lambert J, Coignard B. InVS 2006 (non publié)
International comparison : Wysowski DK, *Public Health Reports* 2006 & Office of National Stastistics, 2006

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C. difficile 027, France

- Epidemic intelligence phase
  - to assess the situation
- State of preparedness
  - to identify the resources
  - to anticipate the measures
- Alert period
  - to investigate the outbreaks
  - to manage the episode
- Follow-up phase
  - to monitor the spread of the strain 027
  - to assess the efficacy of the control measures

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Prevention of CDI

September 2006: Official Guidelines for prevention and infection control from the Ministry of Health (Circulaire DGS/DHOS (09/01/06) and Circulaire DGAS (09/15/06)

- Early diagnosis
  - Unexplained nosocomial diarrhea
  - Usefulness of culture for typing
- Implementation of contact precautions
  - Private room
  - Cohorting with dedicated HCW
  - Closure of wards if necessary
  - Reinforcement of hand hygiene, glove and gown use
  - Dedicated or single use materials
- Reduction of environmental contamination by daily cleaning
  - Hypochlorite 0.5%
- Prevention of CDI
  - Control of antibiotic use
  - Fluoroquinolons and cephalosporins +++ (Simor et al., ICHE, 2002)

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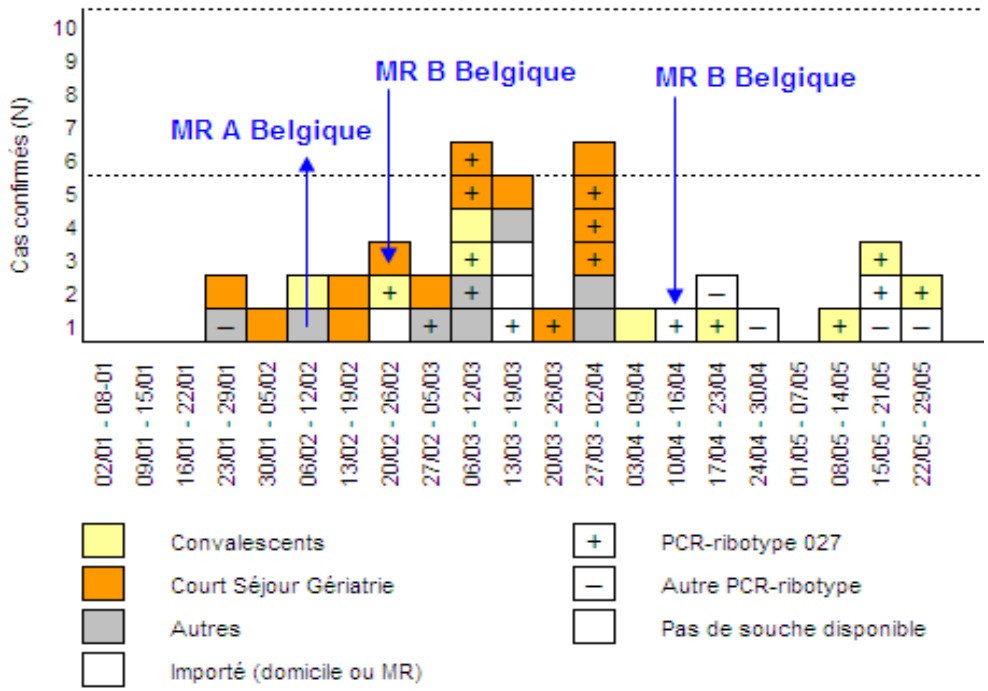
First cluster of 027 in Northern France (03/27/2006)

M Tachon, C Cattoen, K Blanckaert, I Poujol, A Carbonne, F Barbut, JC Petit, B Coignard.
Eurosurv 2006;11(5):E060504.1



- Jan-May 2006: 41 cases (geriatrics, Long Term Facilities)
  - Means age: 83 y
  - 17/22 strains were 027
  - 14 deaths (non attributable to CDI)

- September 2006: second recurrence in 58 additional cases

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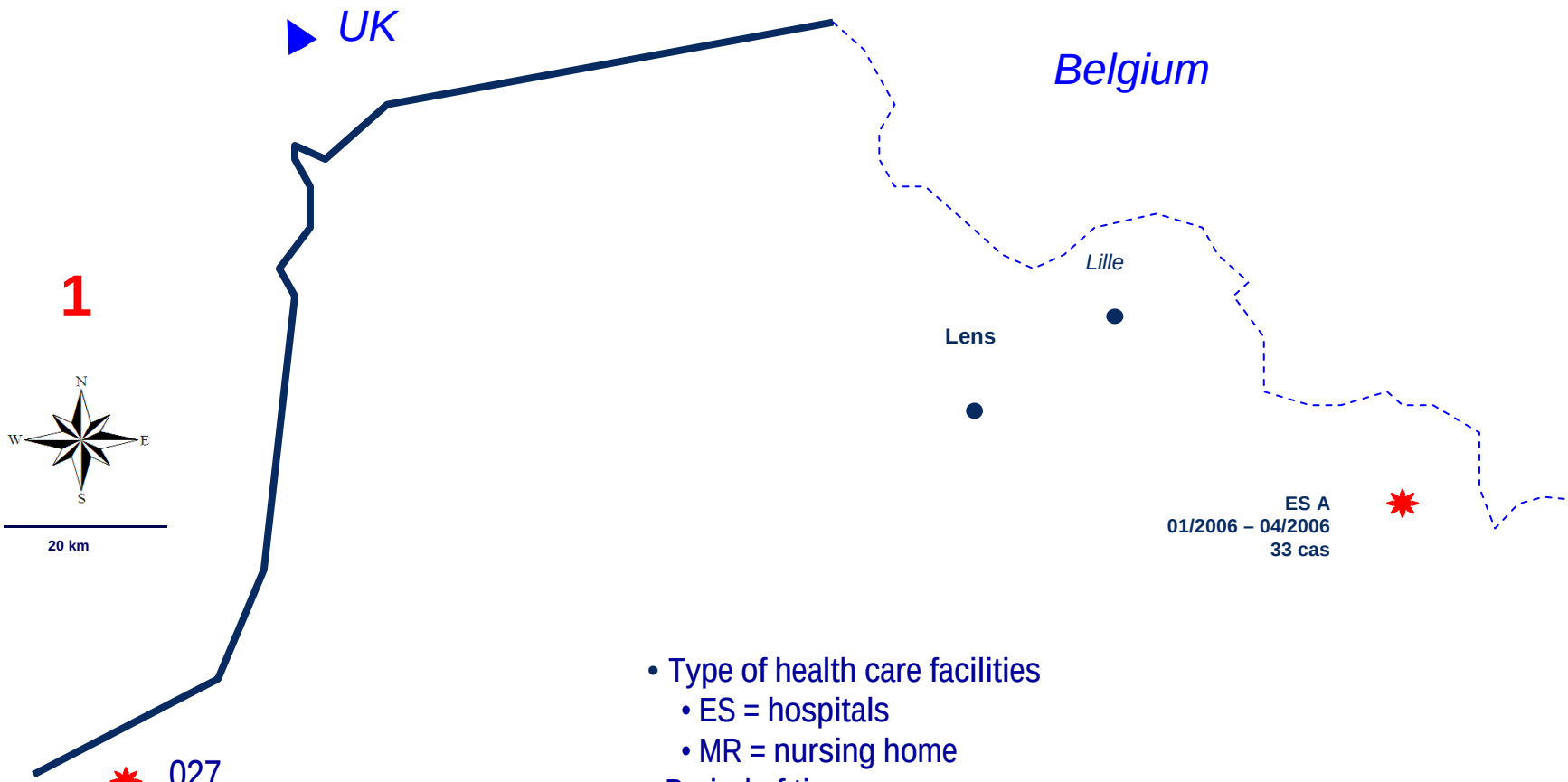
Episodes of CDI, Nord – Pas de Calais, April 2006 (n=1)



027

No 027

Strains not typed

- Type of health care facilities
  - ES = hospitals
  - MR = nursing home
- Period of time
- No cases

Source : Notifications received at InVS / CClin Nord / strains sent to Hôpital Saint-Antoine

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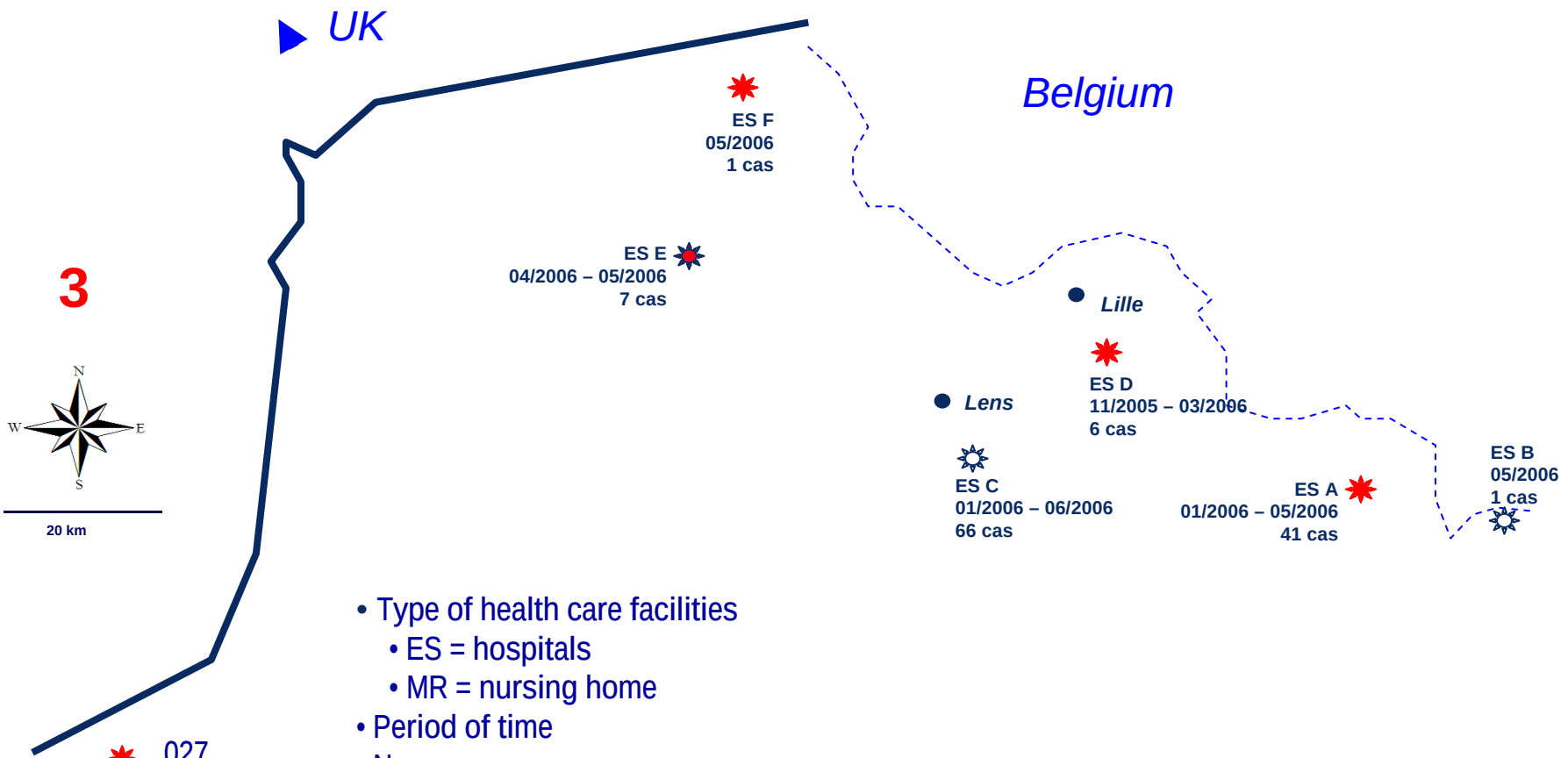
Episodes of CDI, Nord – Pas de Calais, June 2006 (n=6)



Source : Notifications received at InVS / CClin Nord / strains sent to Hôpital Saint-Antoine

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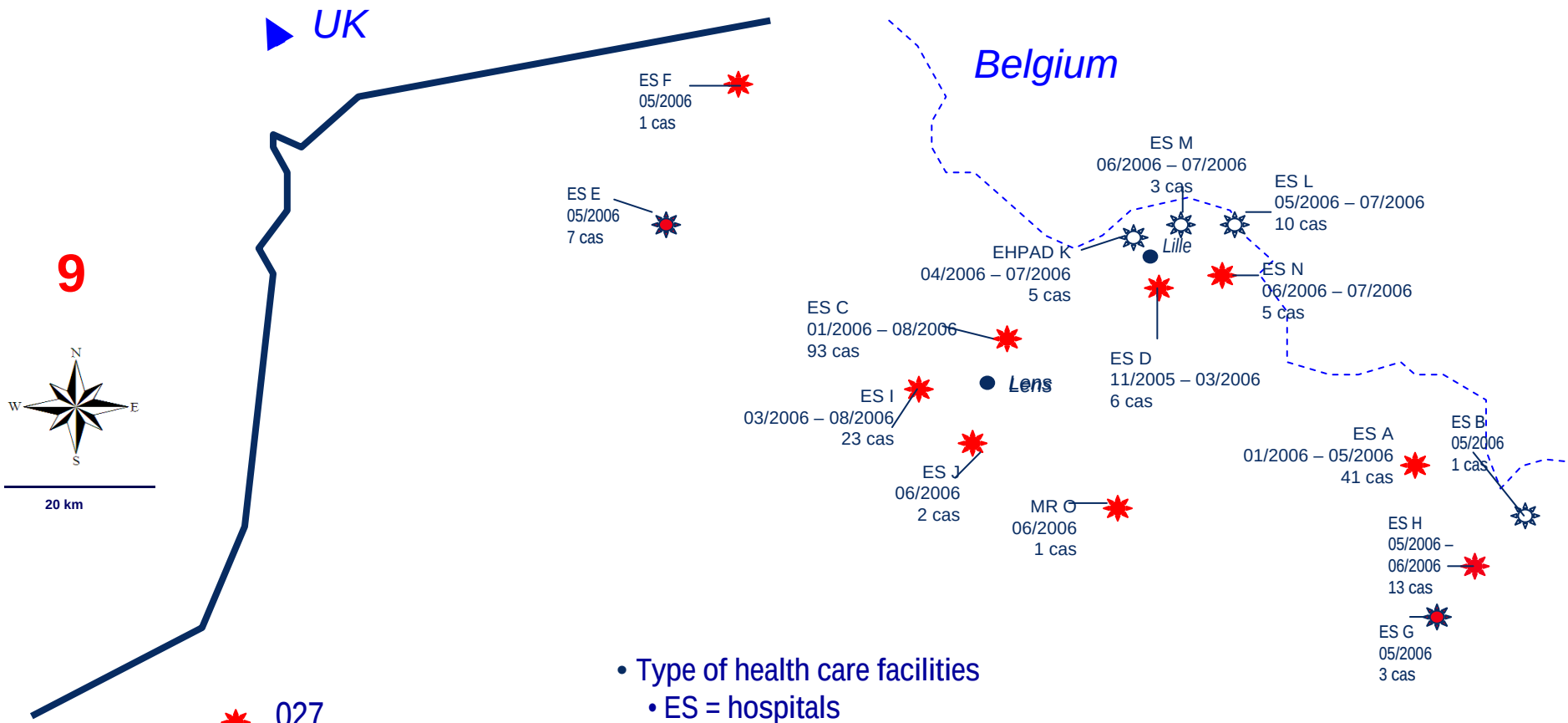
Episodes of CDI, Nord – Pas de Calais, August 2006 (n=15)



- 027
- No 027
- Strains not typed

- Type of health care facilities
  - ES = hospitals
  - MR = nursing home
- Period of time
- No cases

Source : Notifications received at InVS / CClin Nord / strains sent to Hôpital Saint-Antoine

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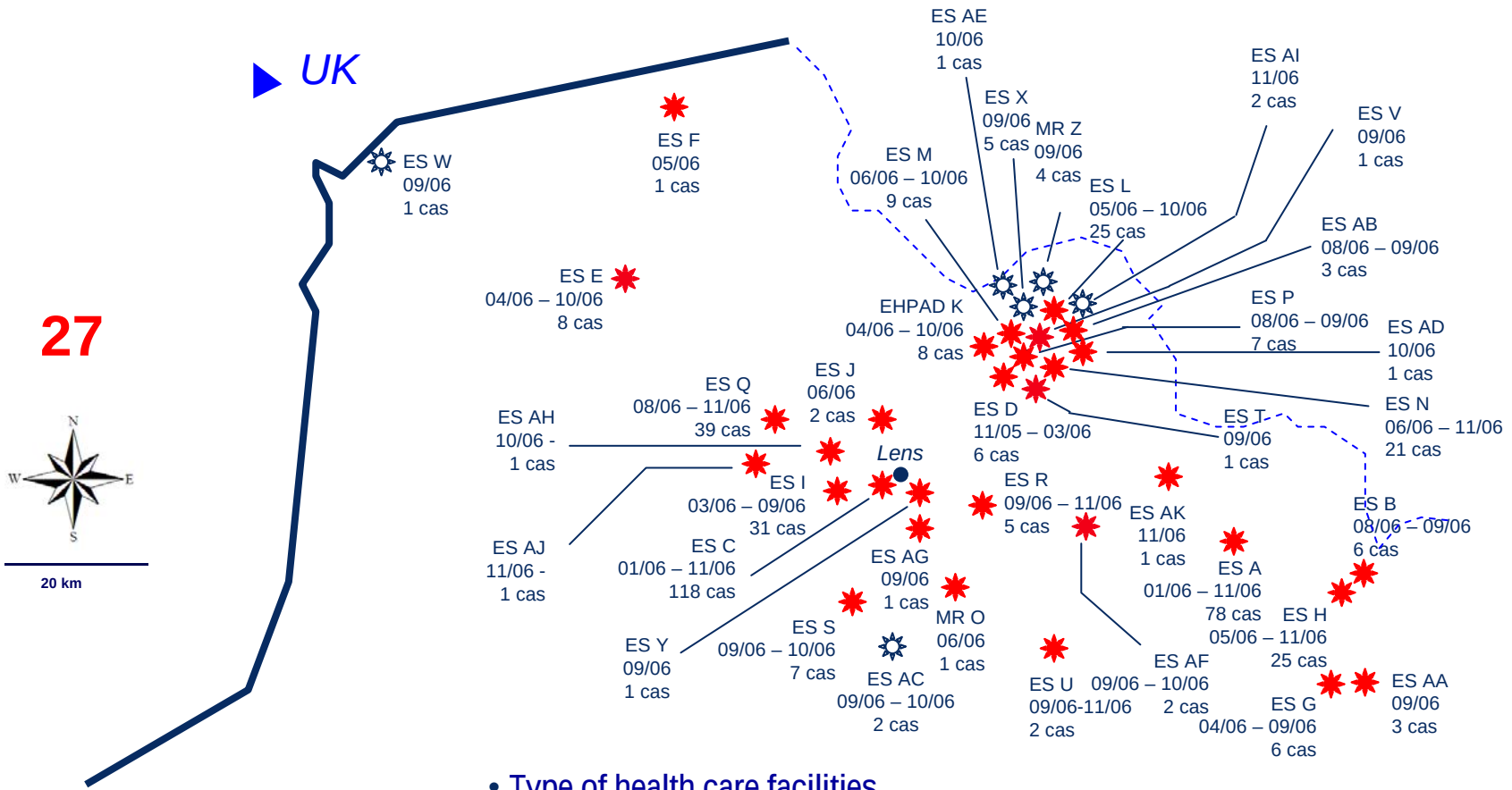
Episodes of CDI, Nord – Pas de Calais, December 2006 (n=37)



- 027
- No 027
- Strains not typed

- Type of health care facilities
  - ES = hospitals
  - MR = nursing home
- Period of time
- No cases

Source : Notifications received at InVS / CClin Nord / strains sent to Hôpital Saint-Antoine

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How to respond to the threat of 027?

- May 2006: Guidelines for diagnosis, surveillance and notification from the National Health Institute http://www.invs.sante.fr/raisin

  Definition of CDI

  Targeted notification CDI (outbreaks and severe cases)

- June 2006: Network of reference labs for typing strains
  http://www.pasteur.fr/sante/clre/cadrecnr/anaer/anaer-activites.html

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Clinical features of CDI, Northern France March 1st, 2007

- 46 episodes, 35 clusters (2 to 118 cases)
  - 55% of cases were clustered in 3 hospitals

- 530 cases of CDI were notified

  - 515 (97%) cases in 41 hospitals
    - Acute care wards (medicine, geriatrics, surgery) and LTF
    - Origin of cases
      - 422 (72%) healthcare-associated, acquired within the hospital
      - 54 (10%) healthcare-associated, imported from another hospital
      - 72 (14%) community acquired
      - 108 (25%) deaths of which 23 (4%) were attributable to CDI

  - 15 (3%) in 5 nursing homes

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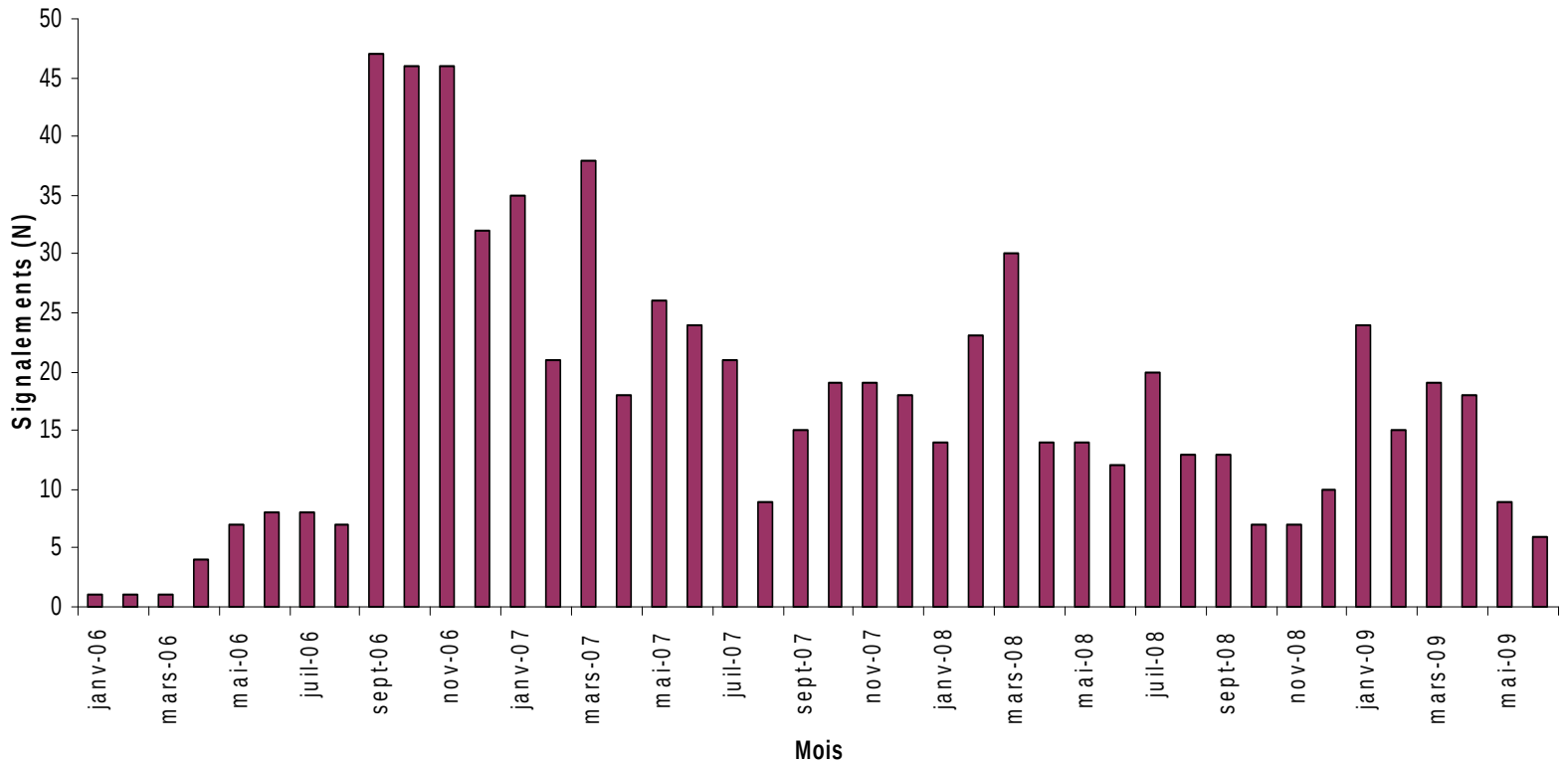
CDI notifications per month, France January 2006 – June 2009 (N= 478)



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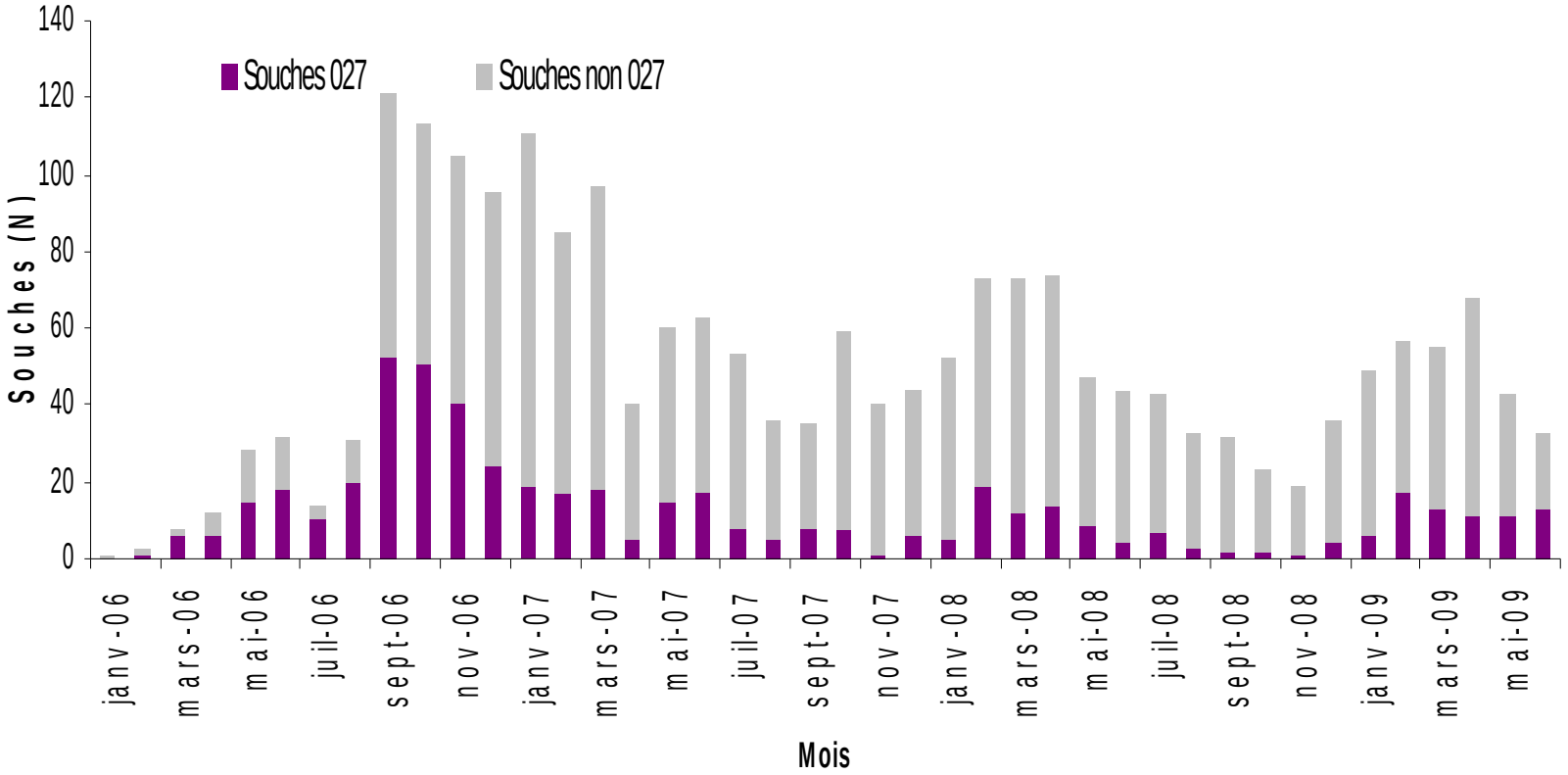
CD strains typed per month(NRC), France January 2006 – June 2009 (N= 2,183)



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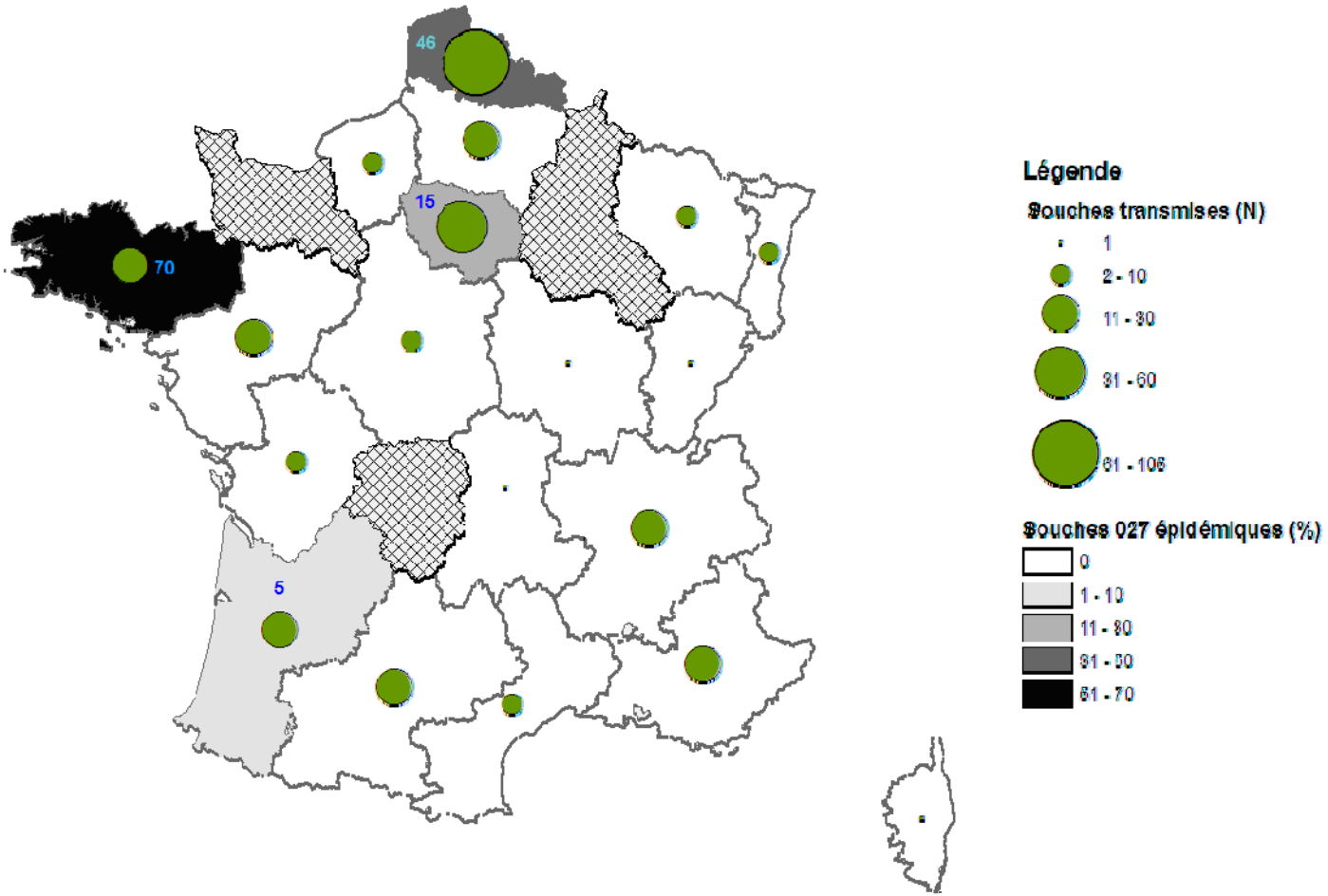
Clostridium difficile, PCR-ribotype 027



Number of *C.difficile* strains typed by the NRC and PCR ribotype 027 proportion per region, France, January to June 2009 (N= 314)

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Following step

A national survey conducted in 2009, in France

- Coordinated by
  - The National Public Health Surveillance Institute (InVS) and the *C. difficile* National Reference Centre (NRC)
  - HCF recruited by regional infection control coordinating centres (CClin)
- To assess
  - CDI incidence in French HCF, independently from any outbreak settings
  - Geographical distribution and characteristics of strains responsible for CDI

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ICD-Raisin Results (Summary)

- First multicenter, national, prospective CDI survey in France
  - Simple surveillance scheme
  - Good participation and representativeness
- CDI incidence : much lower in France than in other EU countries
  - Acute care : 2.3 per 10,000 patient-days
  - Rehabilitation / long-term care : 1.1 per 10,000 patient-days
  - Suggests a good control of CDI outbreaks
- Microbiological characteristics of CD strains
  - The « epidemic » 027 strain: spread limited to Northern France
  - All strains fully susceptible to both vancomycine and metronidazole
  - Picture very similar to the one obtained from the outbreaks detected

See presentation tomorrow (3 June, 16:00, SP7) for full results

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Conclusion (1)

CDI

- *C. difficile* 027 has spread in France: mainly in Northern France
- Incidence of CDI has increased since 2000 but remains lower than that reported in other countries
- Targeted surveillance of CDI has been efficient to timely detect 027
- Investigation of each nosocomial diarrhoea and stool culture are recommended

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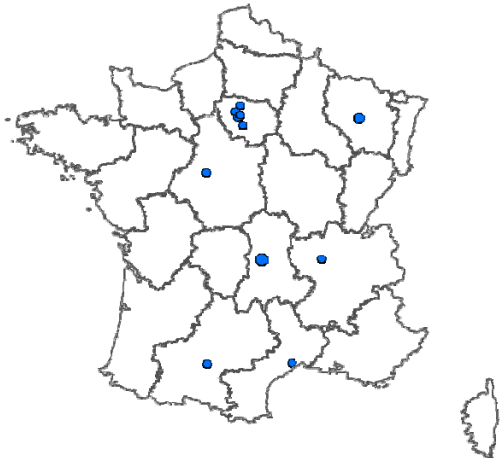
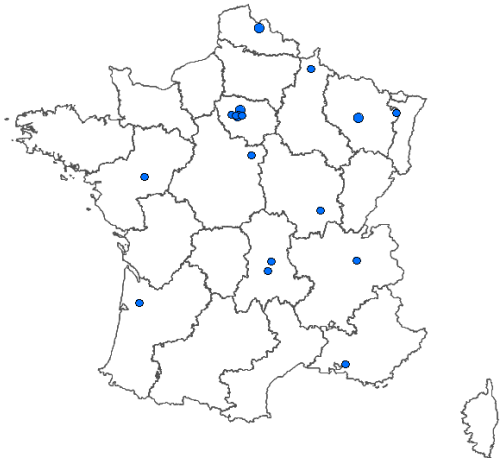
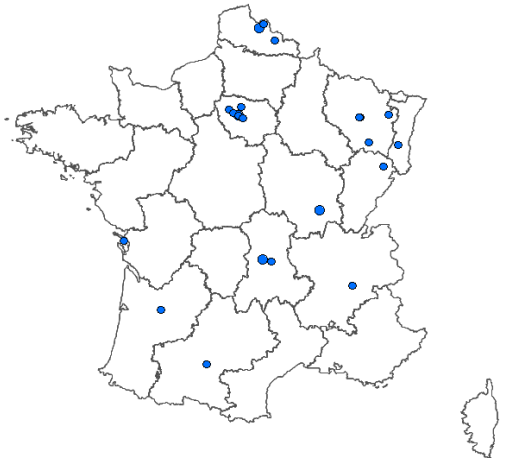
Use of this alert system for another emerging pathogen in France



2004

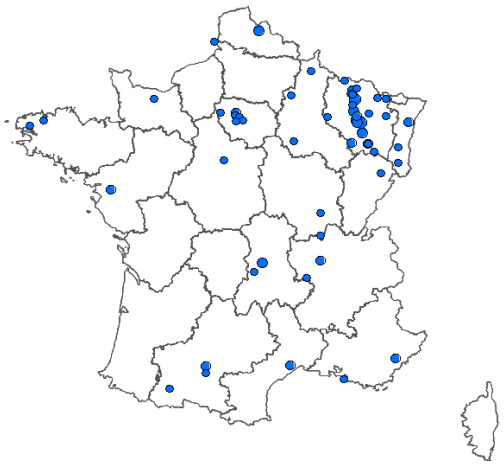


2005

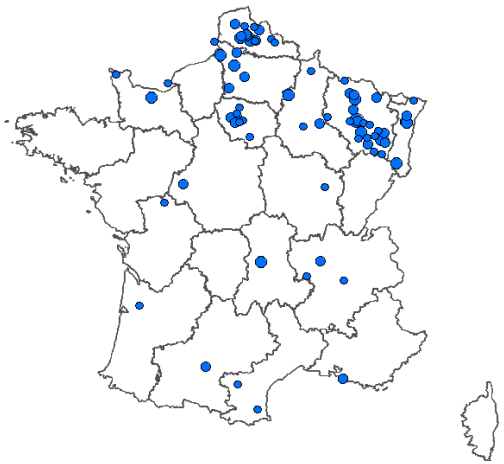


2006

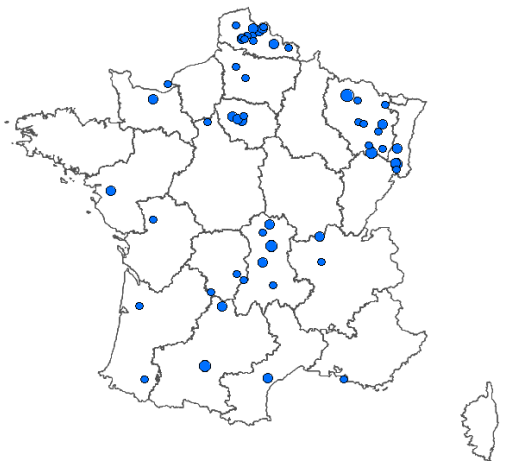
The spread of glycopeptid resistant Enterococci



2007



2008



2009

Conclusion (2)

Early warning system

- Some limitations:
  - no incidence data
- Improvement in:
  - the **detection** of critical events, especially if affecting several HCF or in case of emerging pathogens (i.e. *Clostridium difficile* 027 strain, glycopeptide-resistant *Enterococci*, multidrug-resistant *K. pneumoniae*)
  - **daily assistance** to HCF: investigation, recommendations for control and prevention
  - the **follow-up** of a period of the epidemic spread

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Further information…

- http://www.invs.sante.fr/surveillance/raisin/
- http://www.invs.sante.fr/surveillance/icd/

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Acknowledgments

- Nosocomial Infections and Antimicrobial Resistance Unit: JM. Thiolet, S. Alleaume, B. Coignard
- *C. difficile* National Reference Centre: C. Eckert, F. Barbut
- CClin Est, CClin Ouest, CClin Paris Nord, CClin Sud Est, CClin Sud Ouest
- Local health departments (Ddass)
- And, above all, notifying Healthcare Facilities

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