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# **Control of MRSA Infection in Europe:** **Overview and critical appraisal**

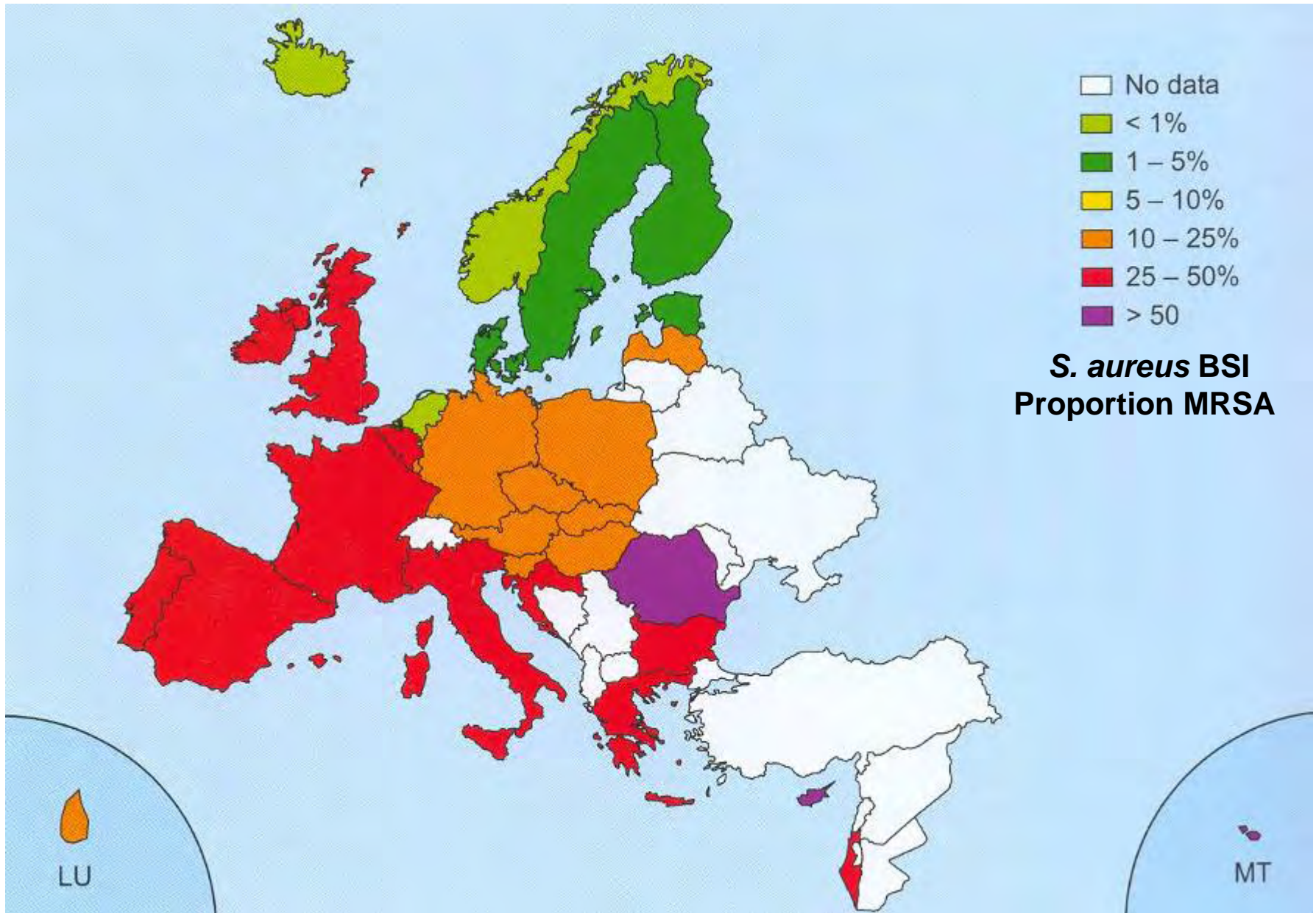
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Stephan Harbarth, MD, MS

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# MRSA bacteremia in Europe, 2005

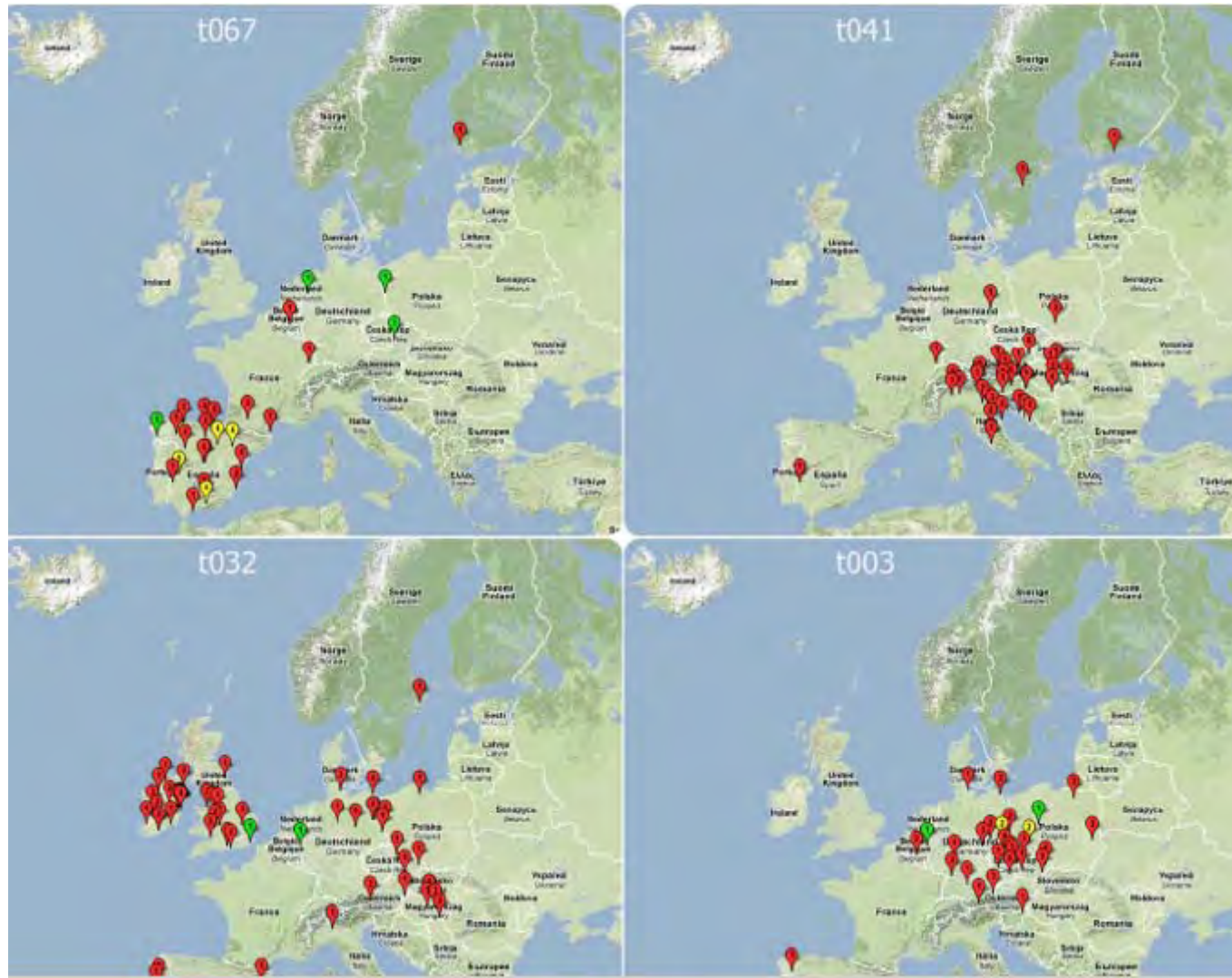


# Possible determinants

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- Pathogens (clonal differences)

# Geographical Clustering of MRSA types from Hospitalized Patients in Europe



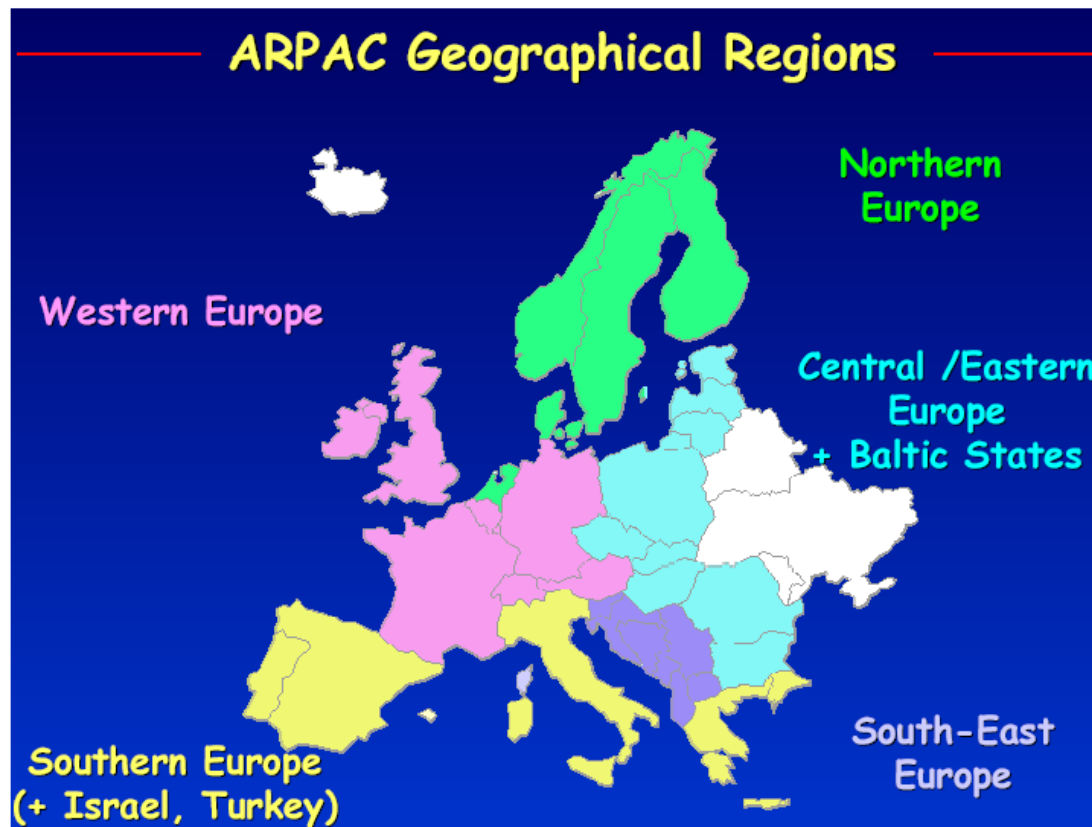
# Possible determinants

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- Pathogens (clonal differences)
- Physicians (diagnostics & antibiotic use)
- Patients (disease patterns, case-mix)
- Macro-level determinants:
  - health care systems
  - sociocultural factors
- Infection control practices



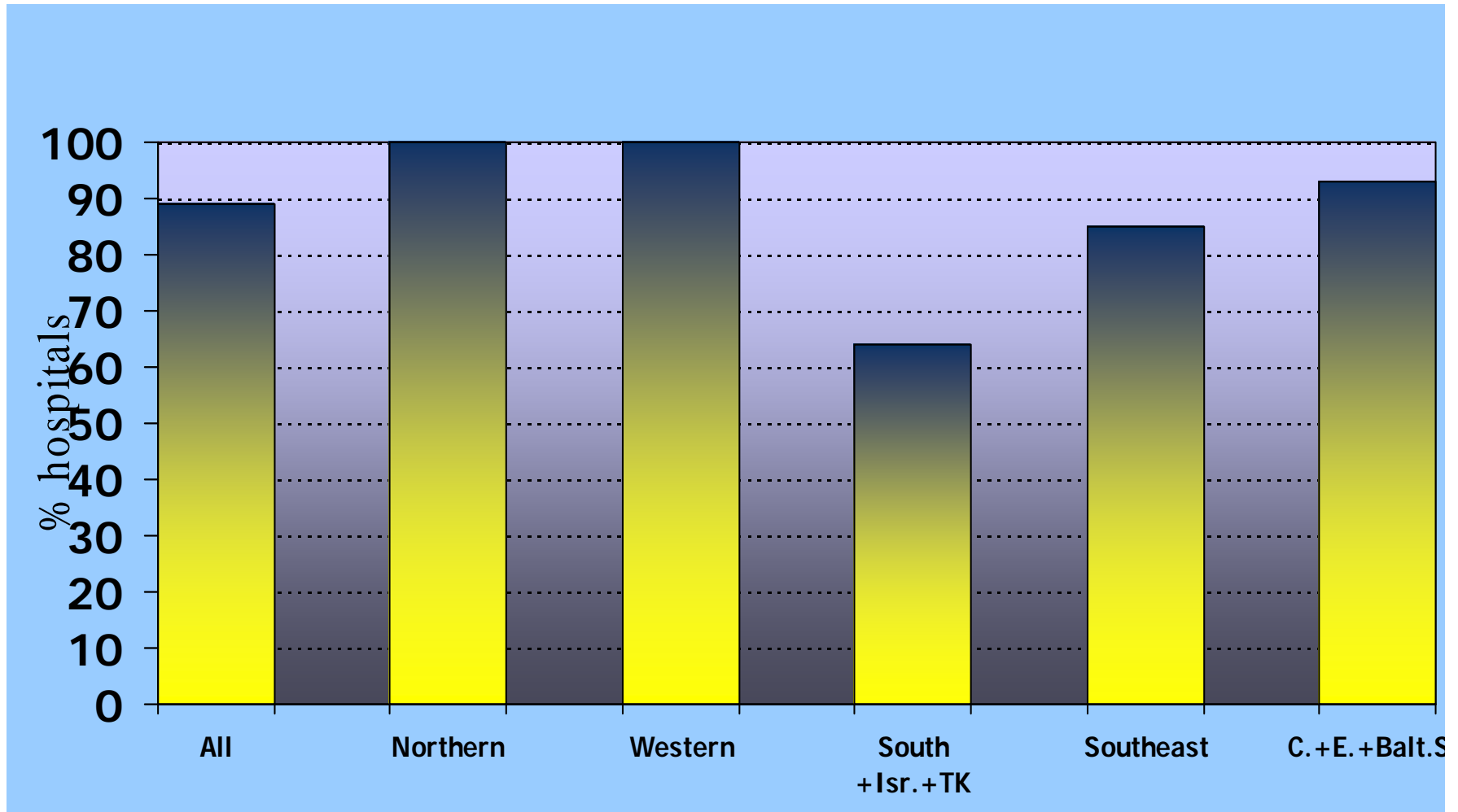
# MRSA control policies in European hospitals ?



Courtesy: Marc Struelens



# Laboratory surveillance of MRSA

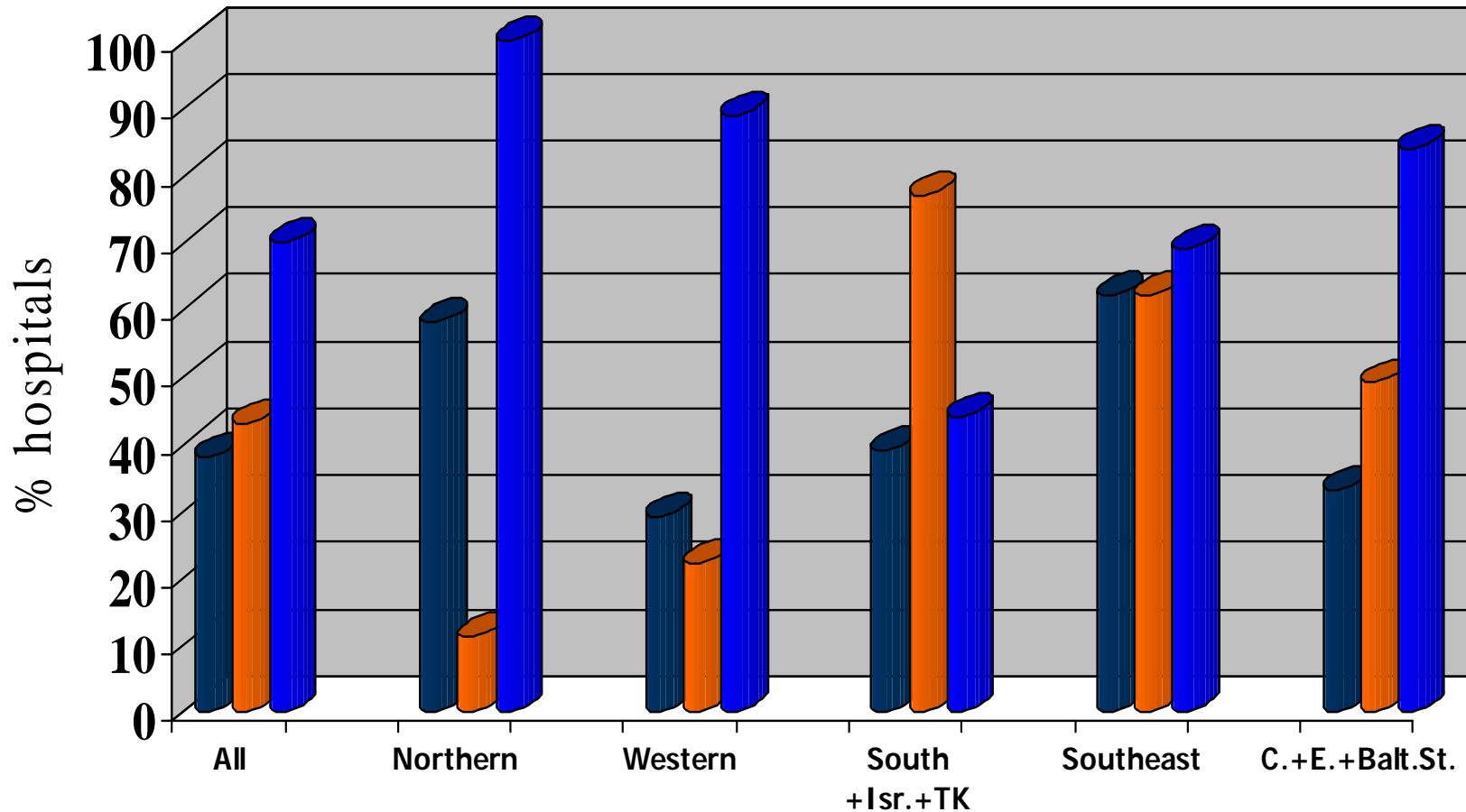




# Hand Hygiene Products by Region

Struelens *Clin Microbiol Infect* 2006;12:729

■ PLAIN SOAP\* ■ MEDICATED SOAP\* ■ ALCOHOL SOLUTION/GEL\*







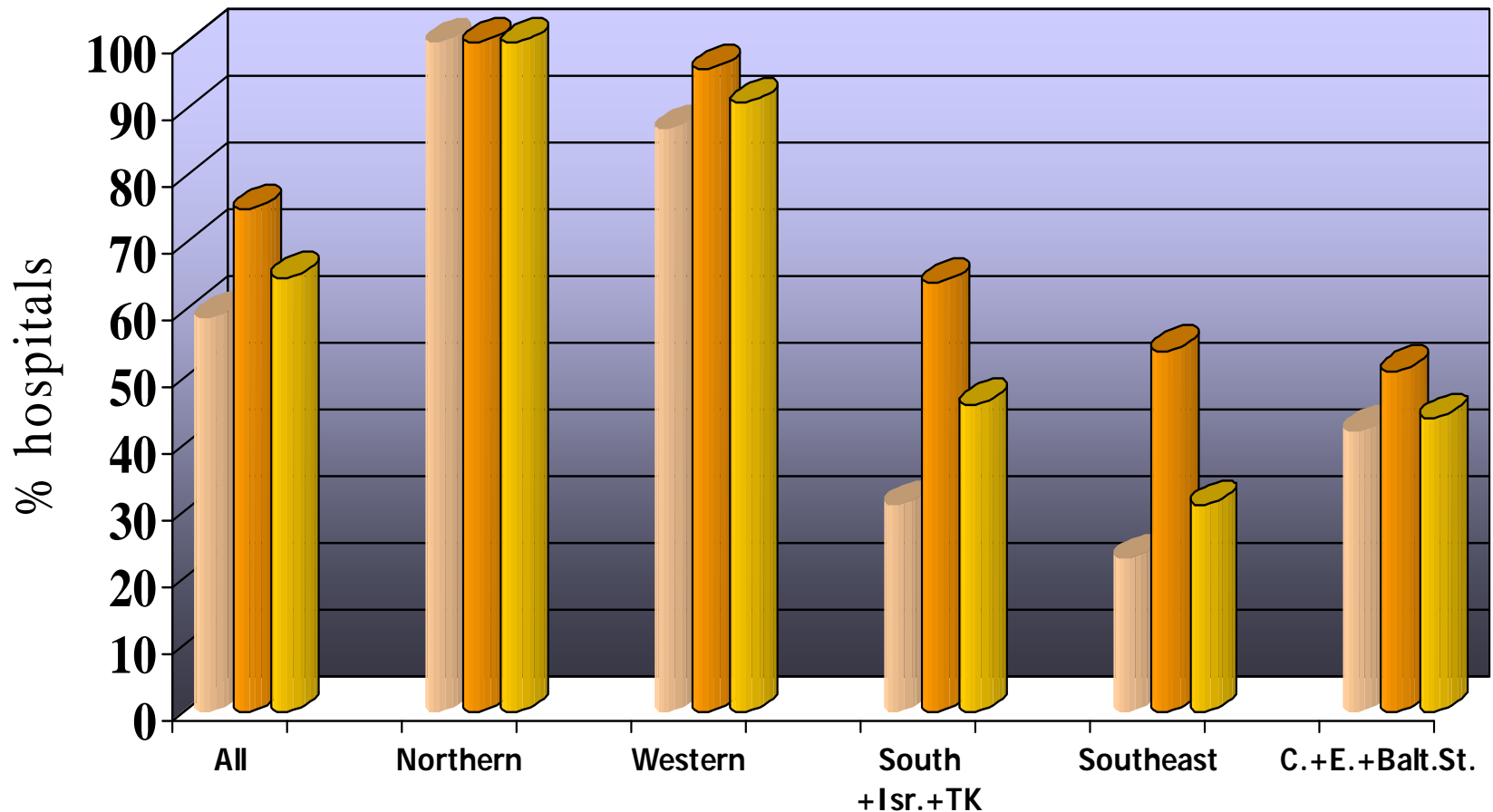
# Alcohol-Handrub Policy Predicts Low Hospital MRSA Rate

- Linear regression modelling of general infection control policies to predict local MRSA rate
- adjusted for antibiotic consumption, case-mix, hospital size and teaching status:
- Alcohol-based hand disinfection (mean difference -10.3 % MRSA rate;  $p=0.005$ )



# Isolation Precautions for MRSA by European Region, 2001

■ SINGLE ROOM ■ GLOVES ■ GOWN



# Isolation Policies Predict Lower Hospital MRSA Rate

- Linear regression modelling of MRSA-specific policies
- adjusted model for antibiotic consumption, case-mix, hospital size and teaching status:
  - **Notification of MRSA** (mean difference -13.5 %; p=0.02)
  - **Single room isolation** (mean difference -11.2 %; p=0.004)
  - **Use of gown** (m.d. -13.1 %; p=0.01)
  - **Problem for isolation** (mean excess + 12%; p<0.001)

# Hand Hygiene Campaigns in European Countries, 2000-2009

WHO First Patient Safety Challenge  
& Hand Hygiene Day on May 5

Survey of hand hygiene campaigns  
in 30 countries (EU & candidate  
countries)

- 13 countries: national campaigns
- 10 countries: regional campaigns
- 3 countries: organizing campaigns



# MRSA Surveillance System by Country and Healthcare Sector, 2009



Acute care hospitals



Chronic care facilities



Primary care

■ National surveillance system

■ No system



# MRSA Control Guidelines by Country and Healthcare Sector, 2009





Acute care hospitals


Chronic care facilities

Primary care

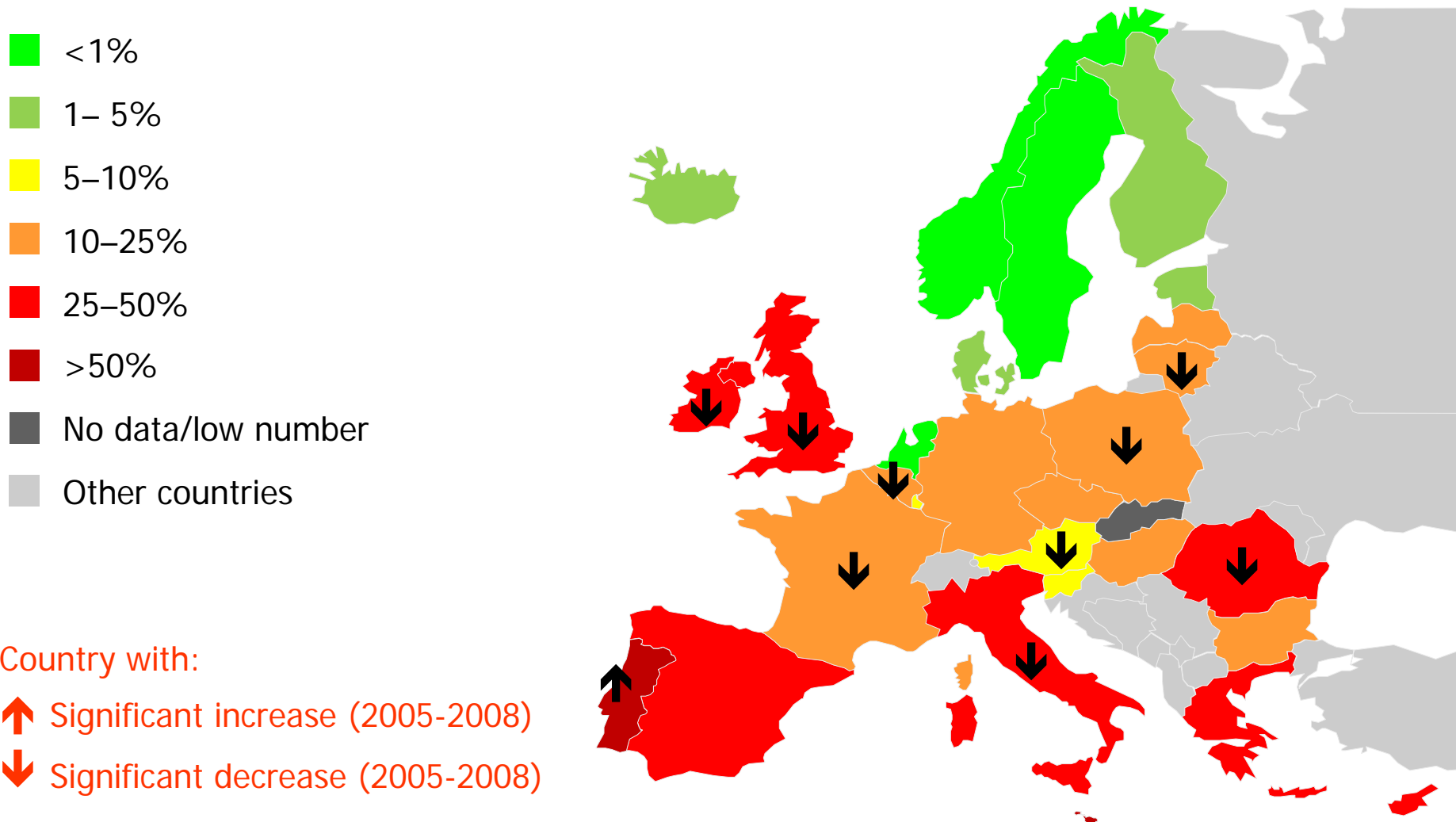
 National MRSA guideline available

 General HAI control guideline

 No guideline

 No data

# Methicillin-resistant *Staphylococcus aureus* (MRSA), blood and CSF, 2008

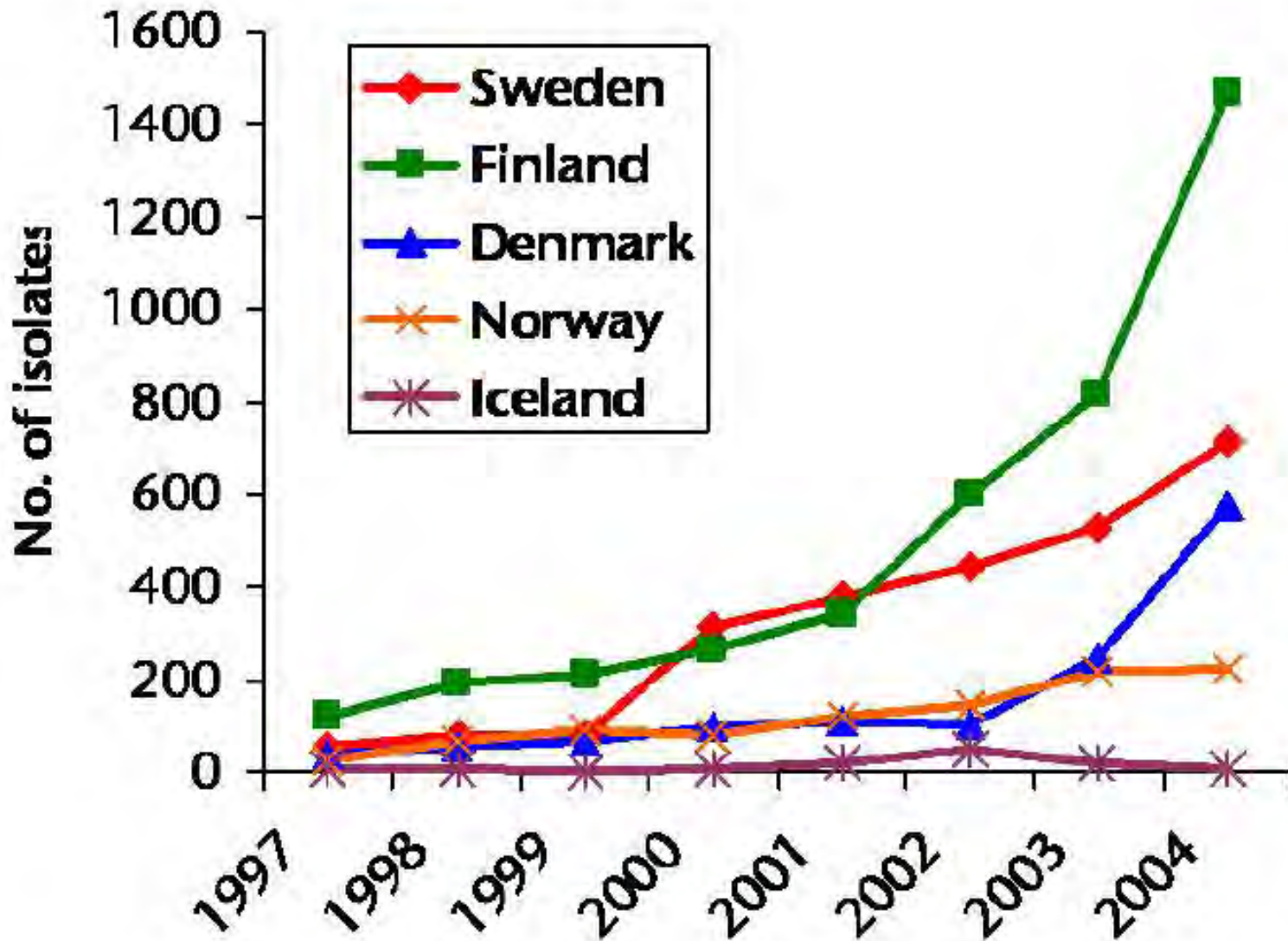




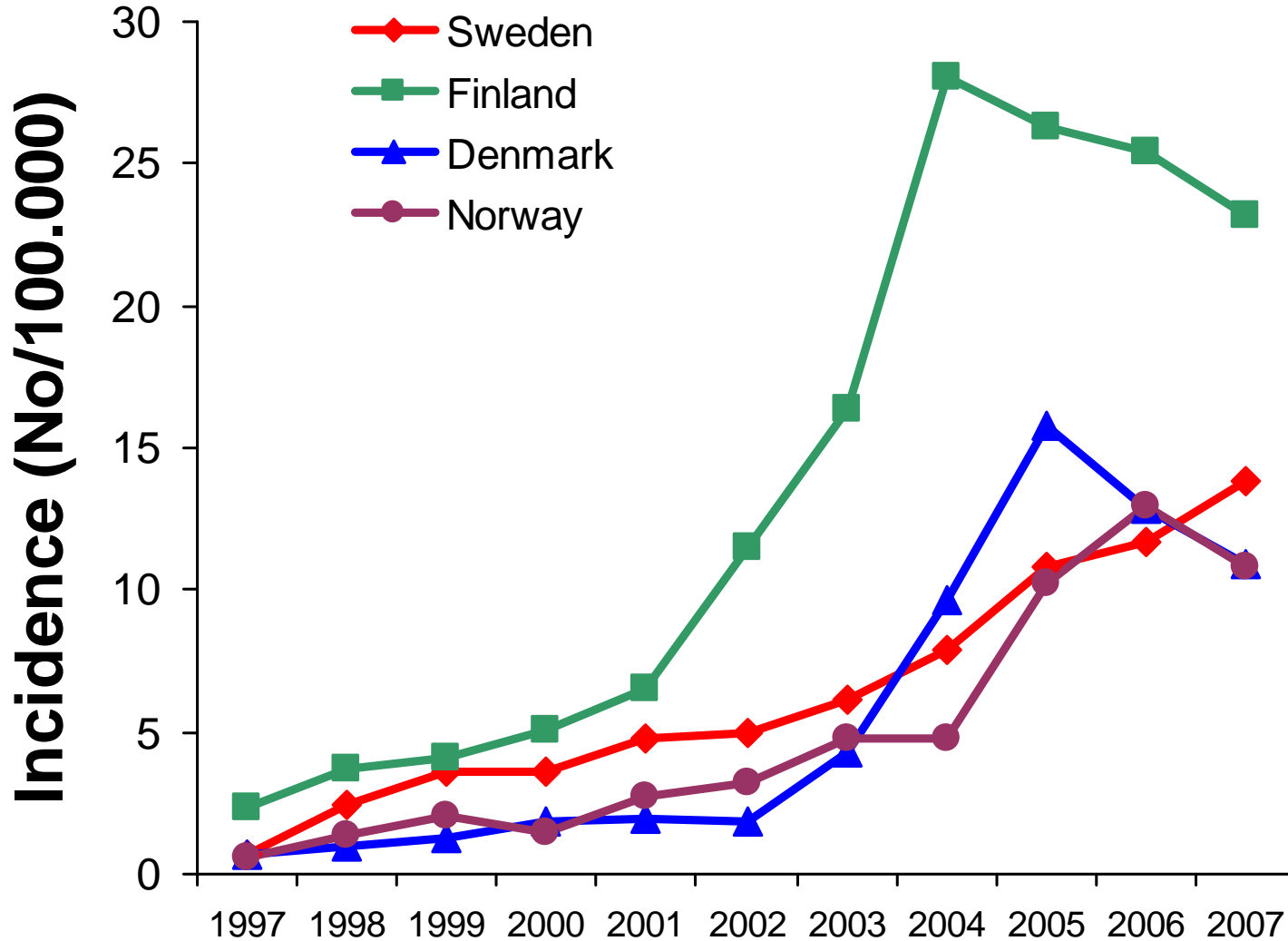
# MRSA control in Netherlands and Scandinavia

- **Strict infection control (S&D)**
- **Active search for occult reservoir**
  - Isolation of pts admitted from foreign hospitals
  - Screening of HCWs who have worked abroad
- **Prudent use of antimicrobials**
  - Restricted use of broad-spectrum agents

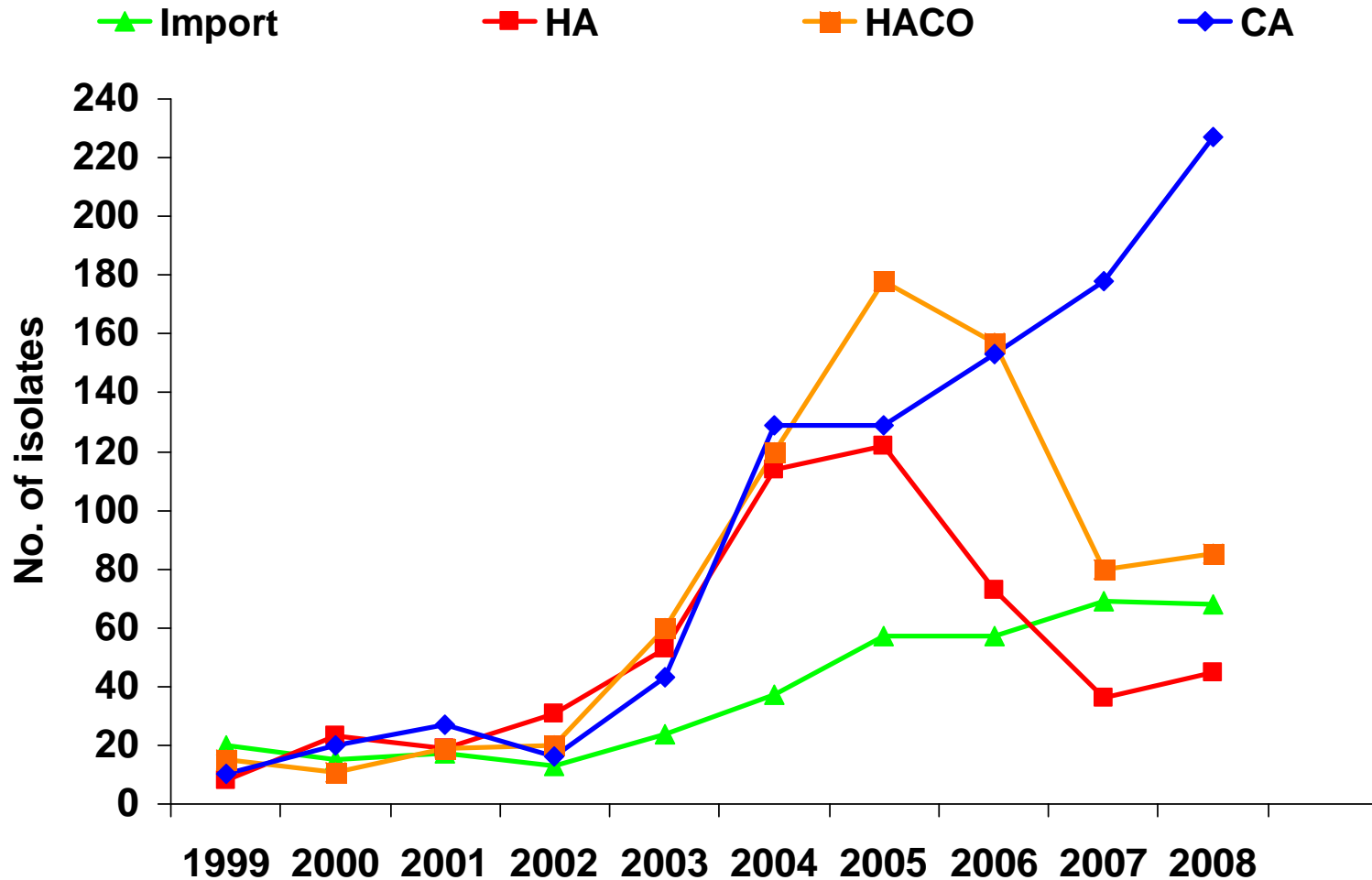
# MRSA in Nordic countries



# MRSA in Nordic countries

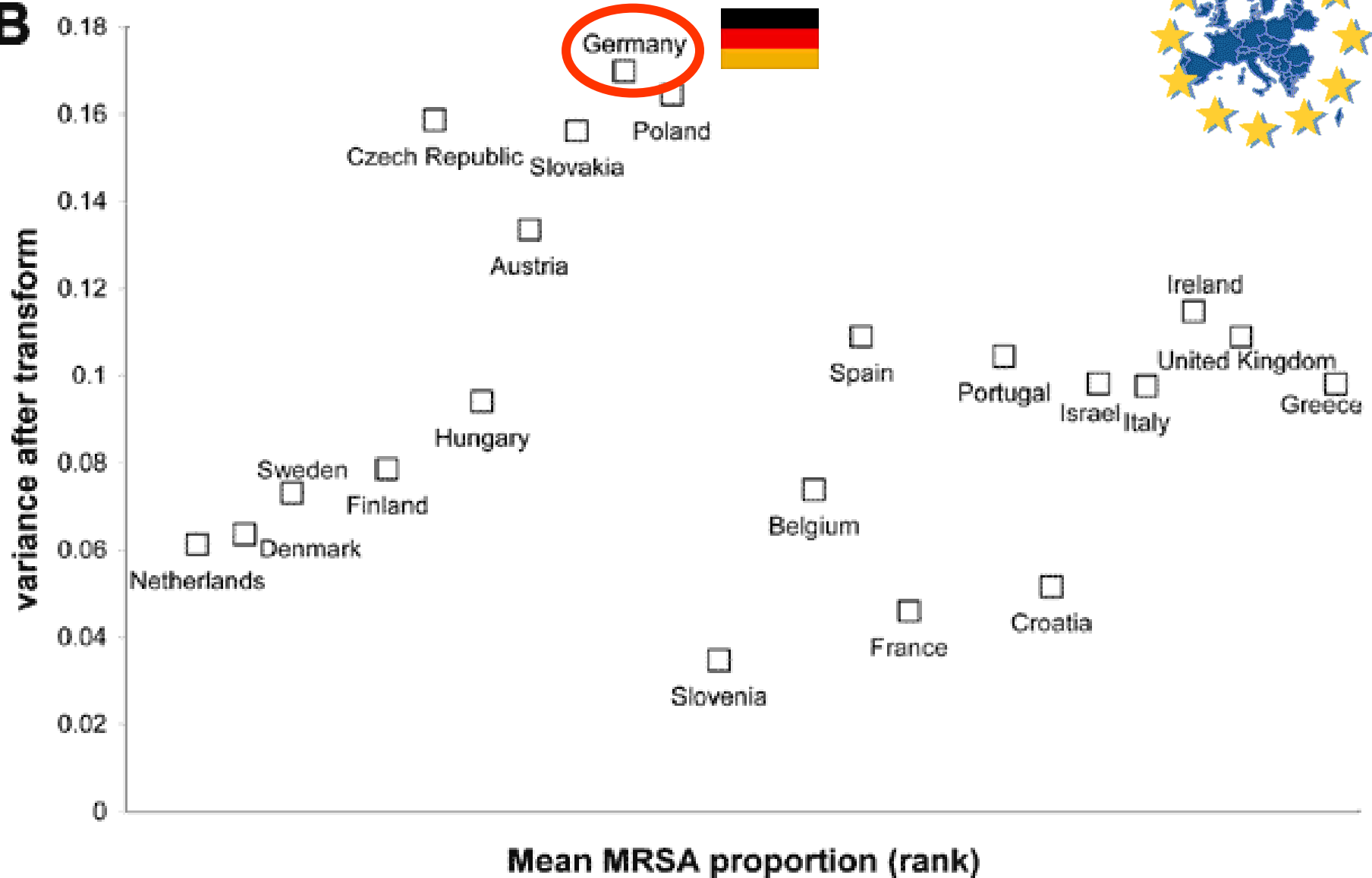


# MRSA infections in Denmark

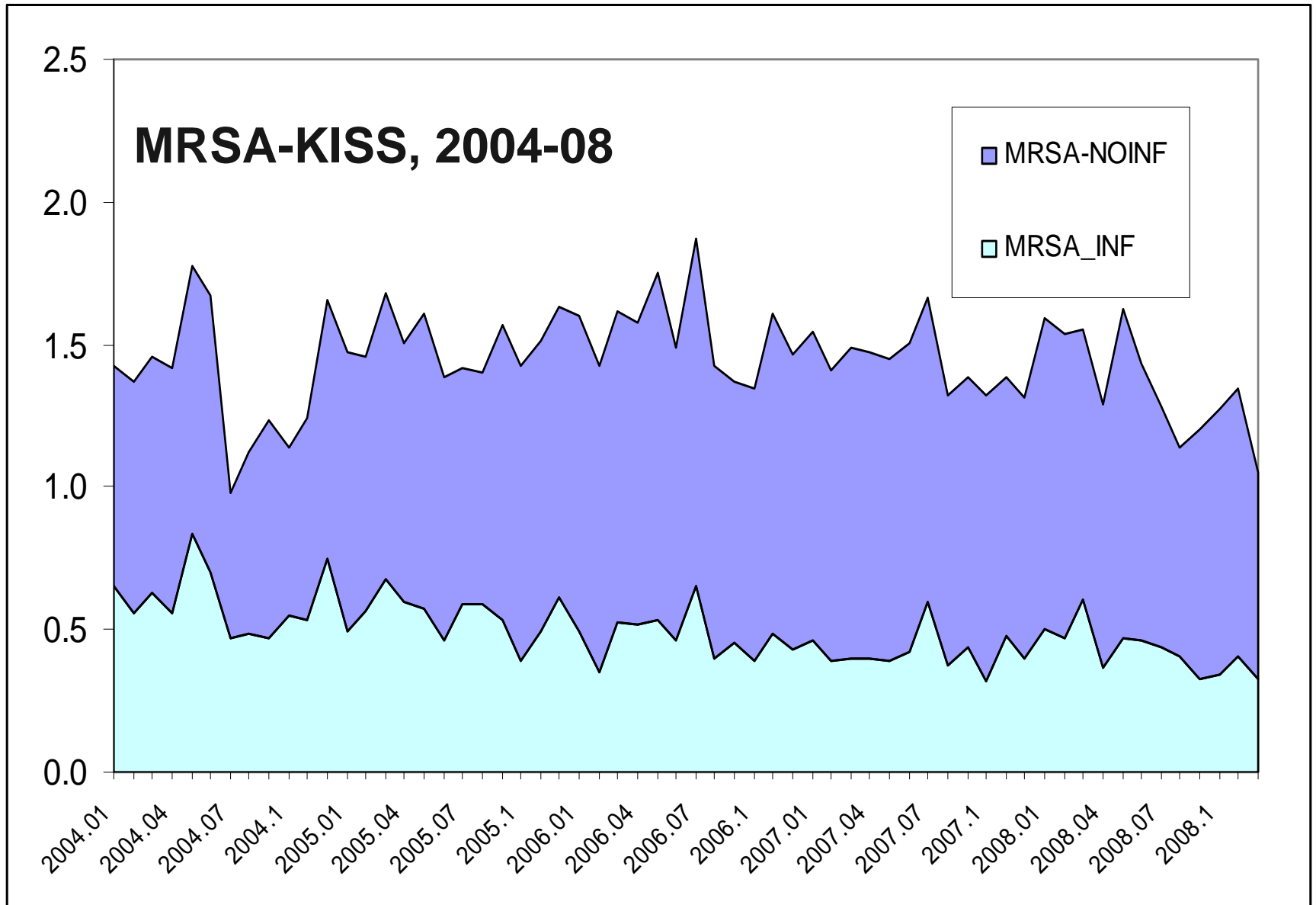


- No standardized MRSA surveillance
- KISS surveillance system since 1997



**B**

# Epidemiology of MRSA infection and colonisation in German ICUs





# MRSA prevention measures in German hospitals

Results of a questionnaire sent to all hospitals participating in MRSA-KISS in February 2007 (n=145)

Answers from 134 hospitals (92 %)

# Do you isolate MRSA patients in private rooms?

Answer	Count	Percentage
Yes, consequently	99	82.5 %
Yes, whenever possible	20	16.7 %
No	1	0.8 %

Questionnaire to MRSA-KISS hospitals, February 2007

# Angeklagter sitzt im Glaskasten

Dem ehemals erfolgreichen Musiker, der unter einer hochansteckenden Krankheit leidet, wird Kindesmissbrauch vorgeworfen.

Während der Verhandlung sitzt Shanti in einem Glaskasten. Er hat sich in der Untersuchungshaft den hochansteckenden MRSA-Keim, auch Krankenhauskeim genannt, eingefangen – und damit eine Multi-resistenz gegen Antibiotika. Deshalb muss er zudem einen Schutzanzug, Überschuhe und Gummihandschuhe tragen.



*Der Angeklagte auf dem Weg zu  
seinem Platz* BILD: DPA

# Do you decolonize MRSA patients (e.g. with Mupirocin)?

Answer	Count	Percentage
Yes, every MRSA patient	97	72.4 %
Yes, but selected patients only	34	25.4 %
No	3	2.2 %

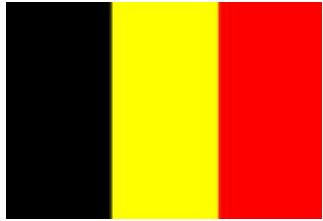
**Questionnaire to MRSA-KISS hospitals, February 2007**

# For which patient groups routine screening is organized?

Answer	Count	Percent
Readmitted former MRSA carriers	132	98.5 %
Contact patients (roommates)	127	94.8 %
Patients at high risk (e.g. patients with wounds, dialysis, from rehabilitation centers etc.)	115	85.8 %
ICU patients (universal admission screening)	115	11.2 %

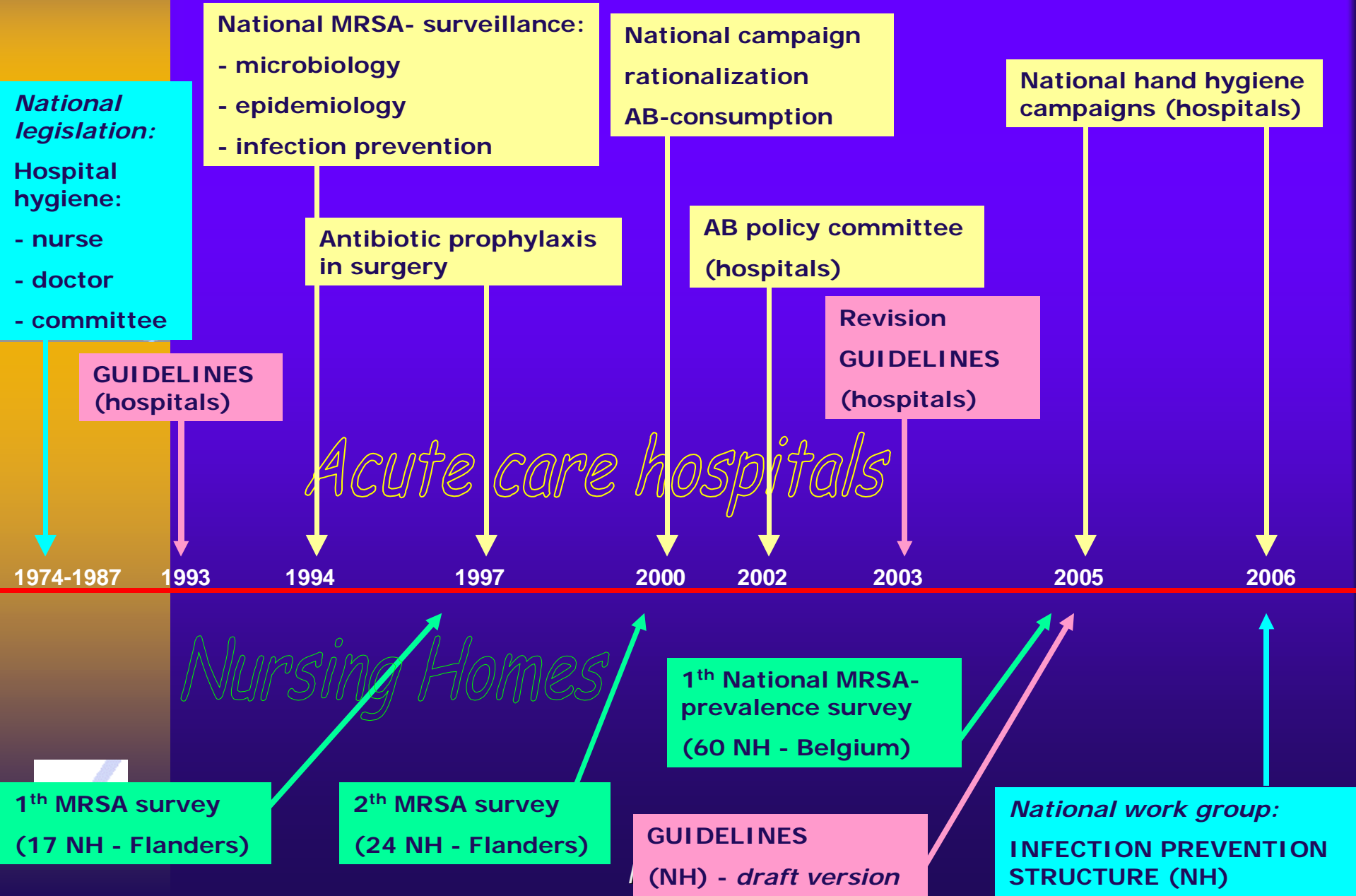
**Questionnaire to MRSA-KISS hospitals, February 2007**

**Since 1994 voluntary declaration  
system of nosocomial MRSA**



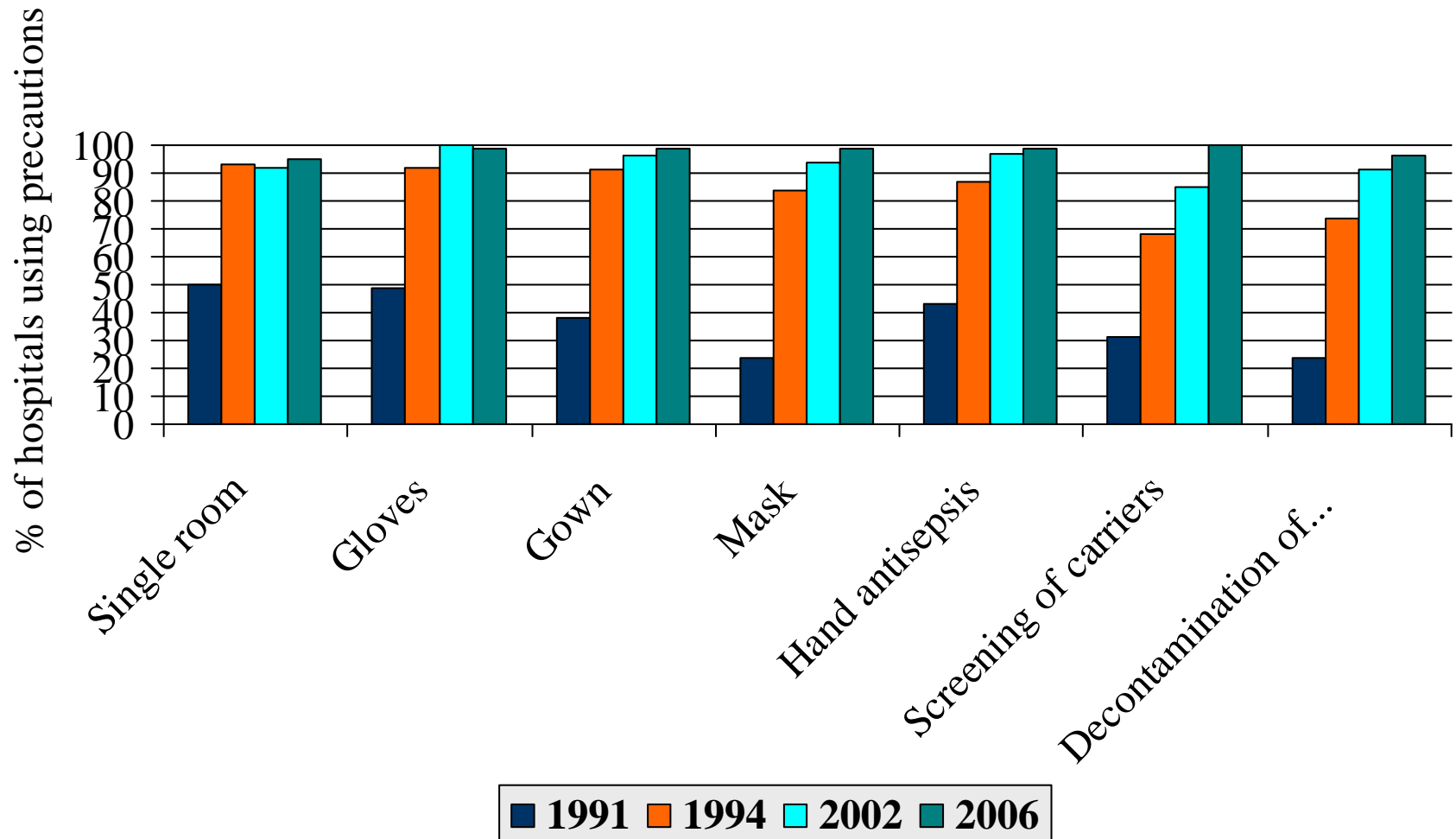
# Belgium National actions

Courtesy: M. Struelens

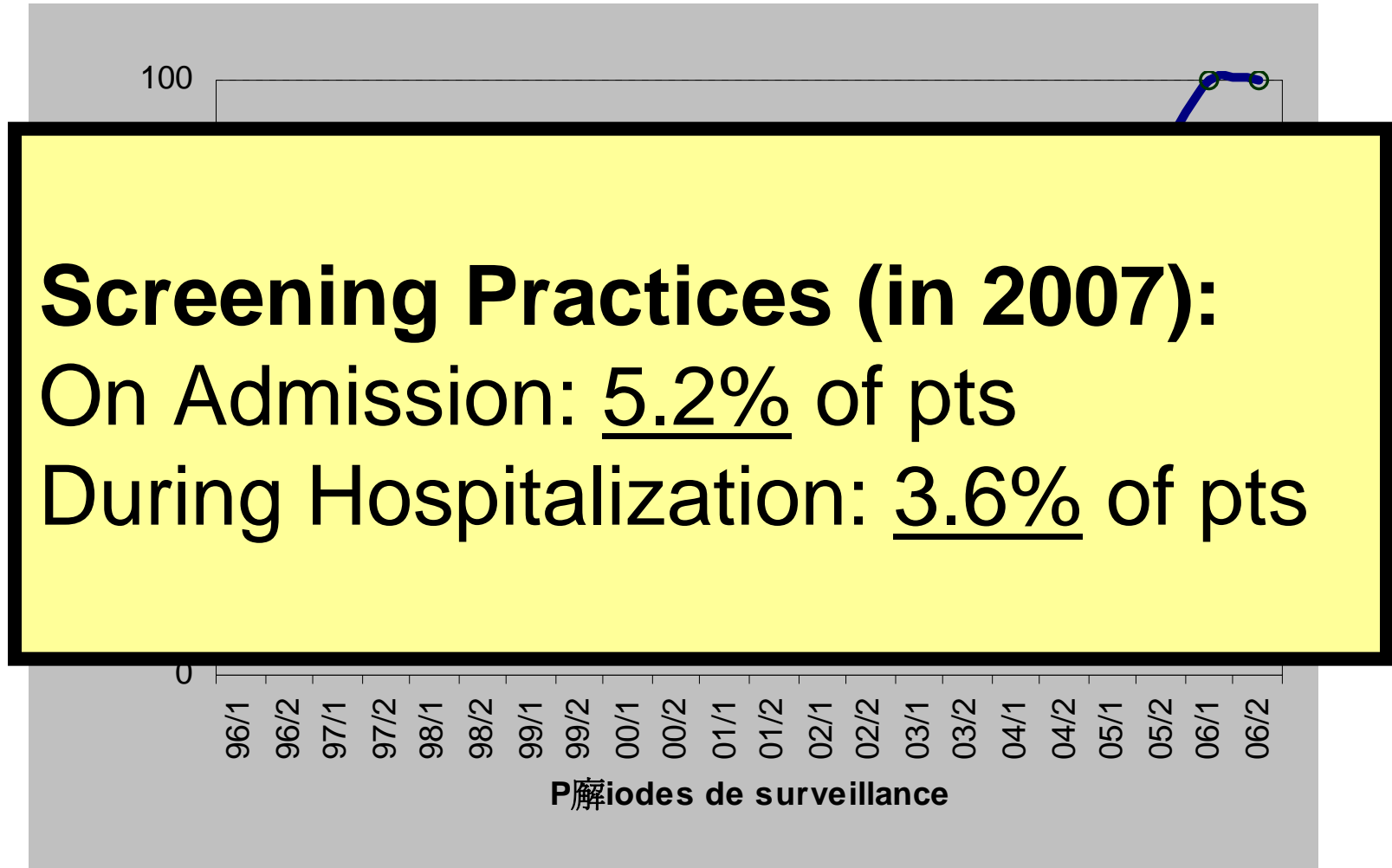




# Adoption of National MRSA Control Policy by Belgian Hospitals, 1991-2006

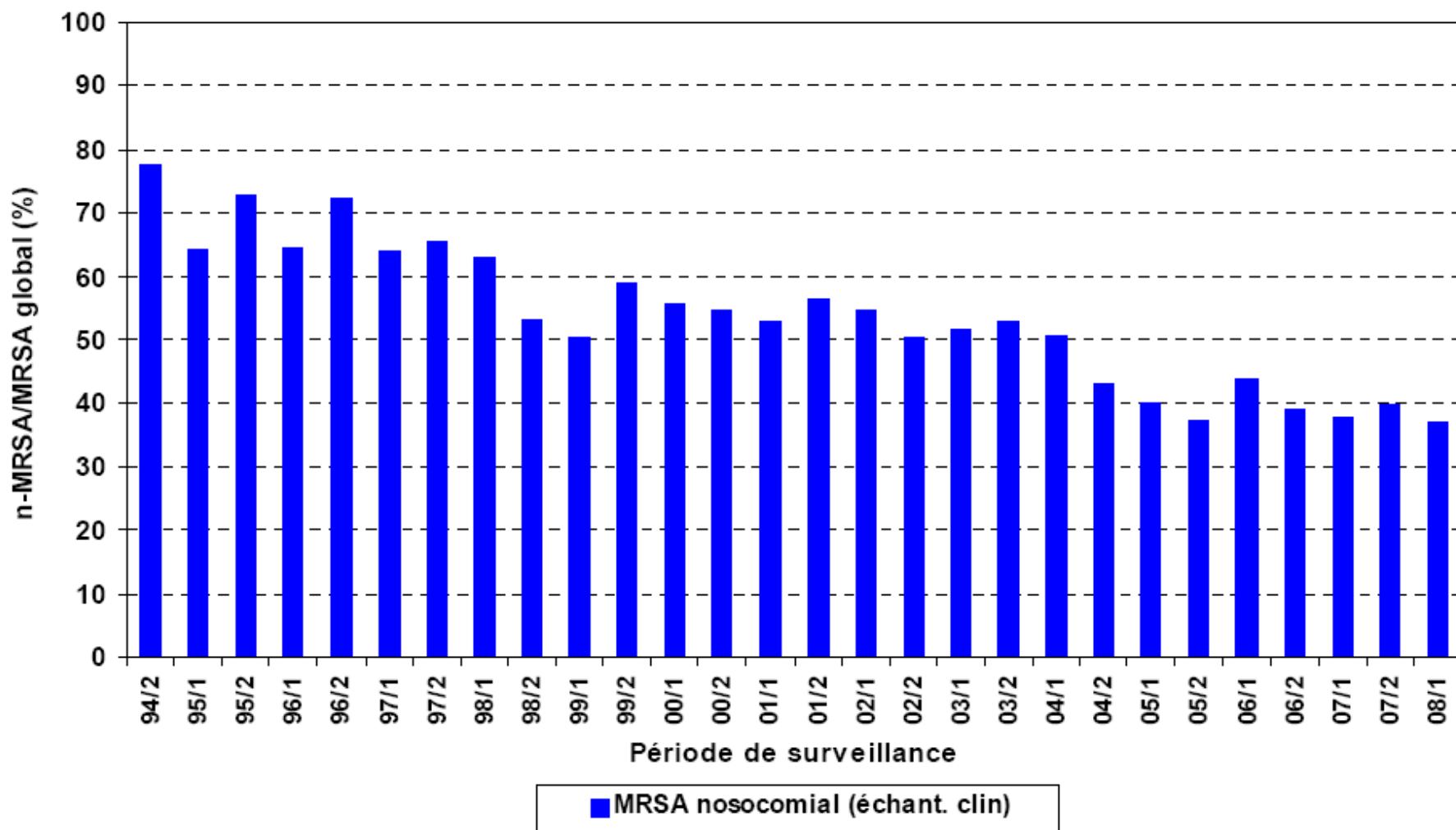


# Proportion of Belgian hospitals performing admission MRSA screening, 1996-2006



Source: B.Jans; M.Struelens (IPH surveillance report 2007)

# Nosocomial MRSA acquisition

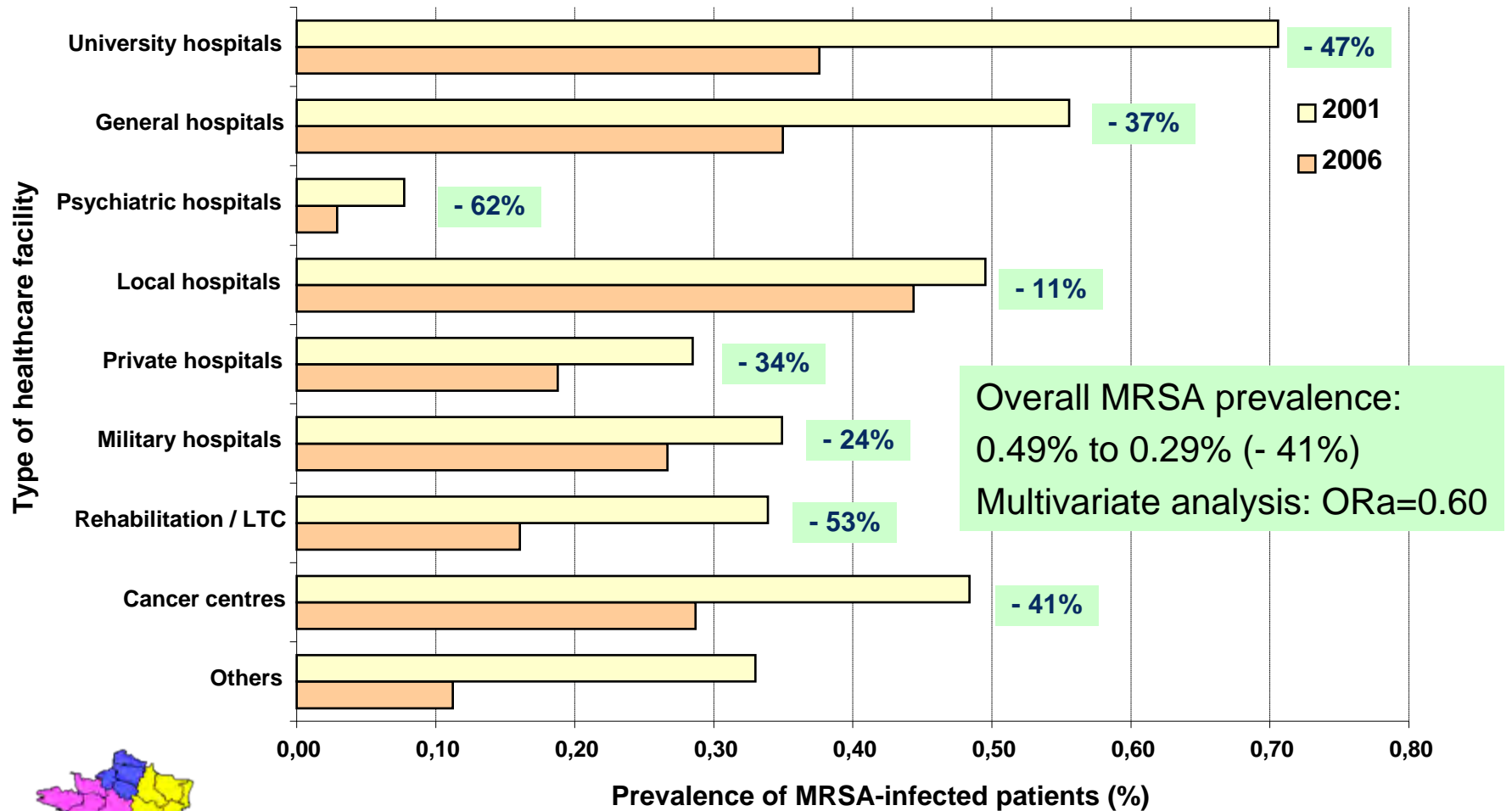




Mobilisation générale :  
« aux **SARM!** »



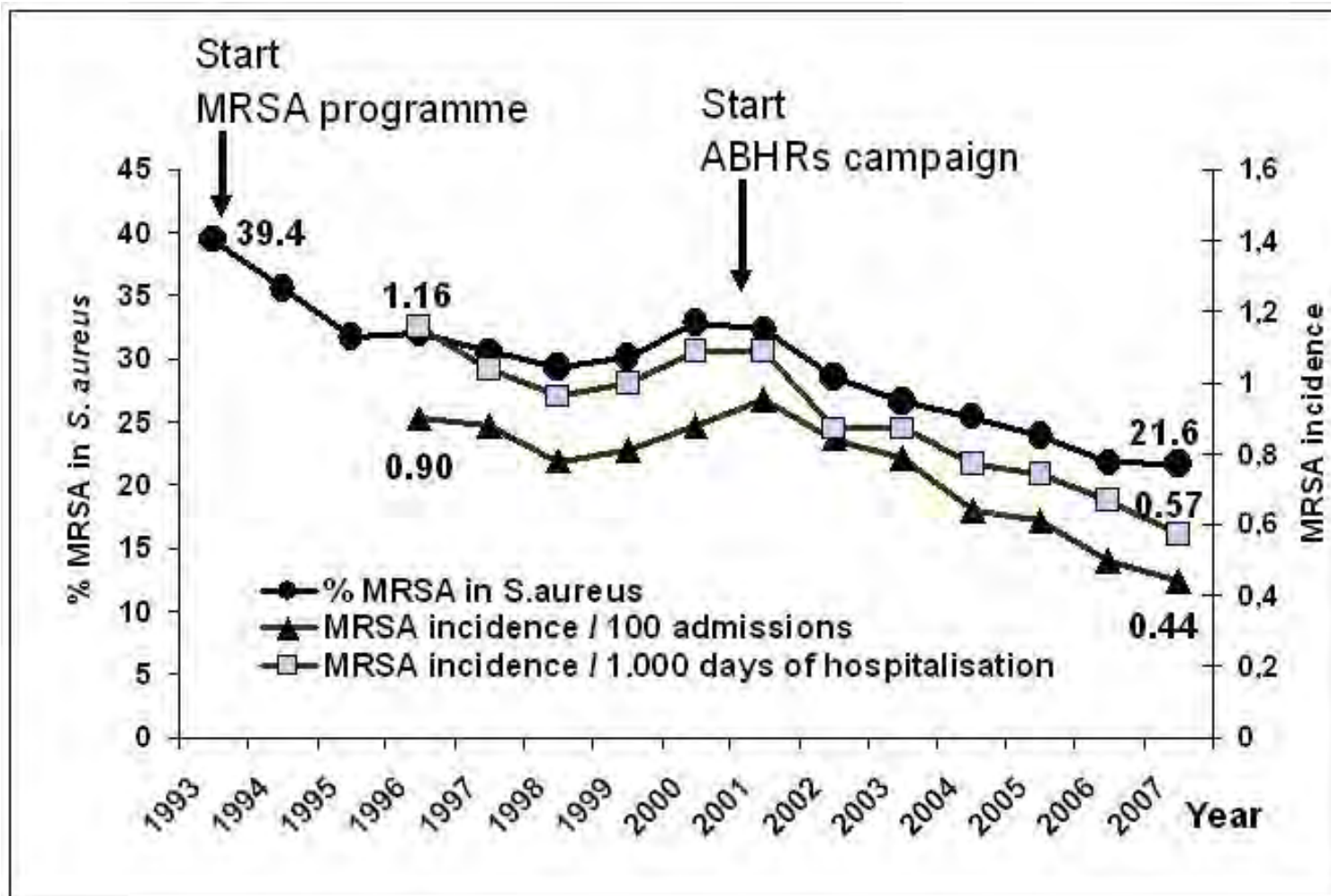
# Prevalence of MRSA-infected Patients, France, 2001 - 2006



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

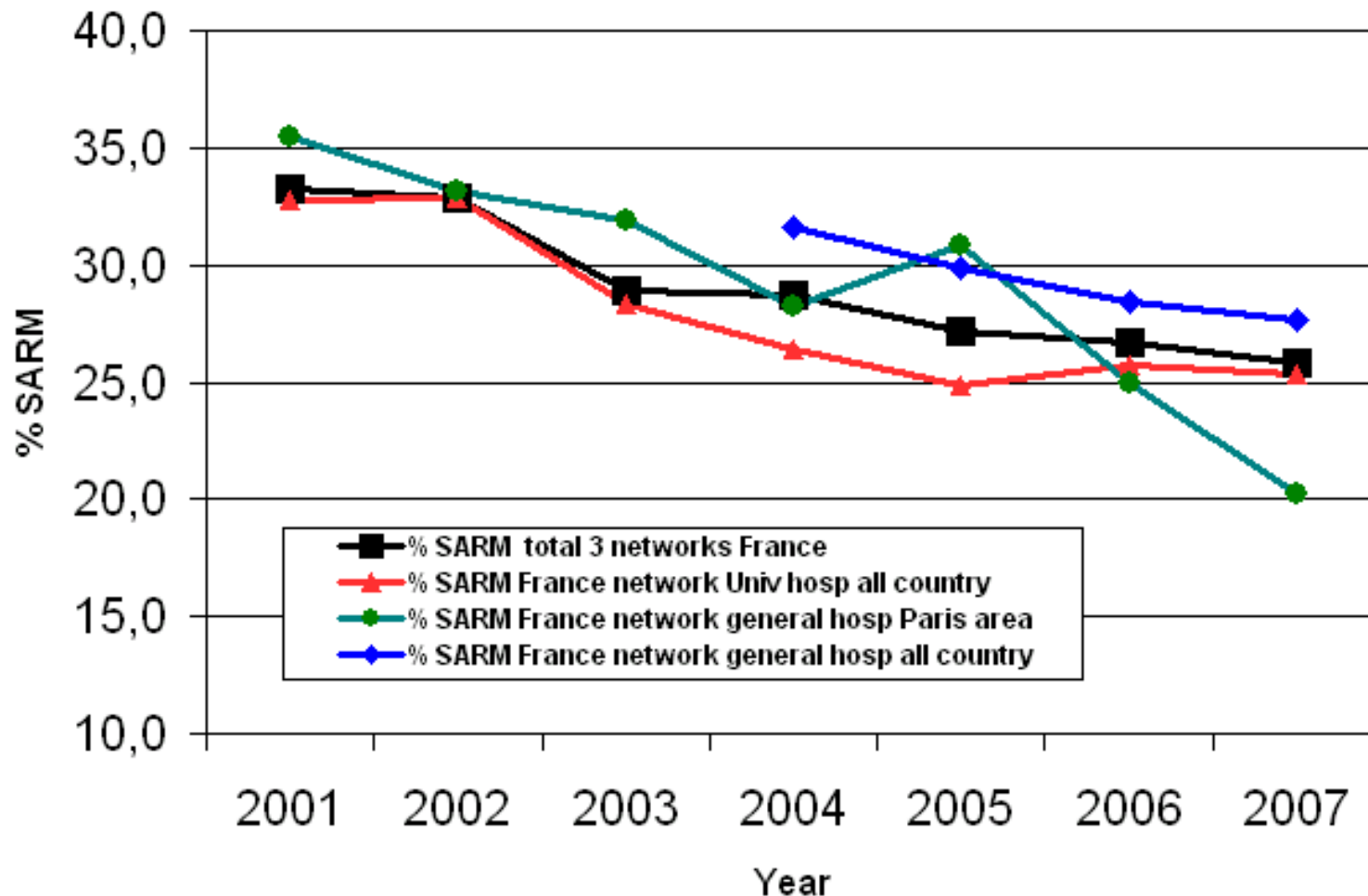


# % MRSA in *S.aureus* and MRSA incidence per 100 admissions or 1000 days of hospitalisation Univ. hospitals of Paris area (n=39) 1993-2007



# % MRSA in *S. aureus* from bacteremias in the 3 French networks participating in EARSS, 2001-2007

(19 Univ hosp all country , 9 general hosp Paris area, 25 general hosp all country)



Courtesy: D. Trystram, Y. Péan, H. Chardon, B. Coignard, V. Jarlier (Oct 2008)



# Determinants of success

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- **Leadership & commitment**
- **Nation-wide implementation of IC programs**
  - Dedicated and coordinated IC networks providing training, surveillance & evaluation
  - Ministry of Health: Resources and incentives
- **Recommendations & initiatives:**
  - Promotion of hand hygiene since 1998
  - Targeted screening & isolation of high-risk pts
  - Universal screening in ICUs only



- **Mandatory surveillance of MRSA bacteremia**
- **Goal: To reduce MRSA bacteremia rate by 50% (by 2008)**



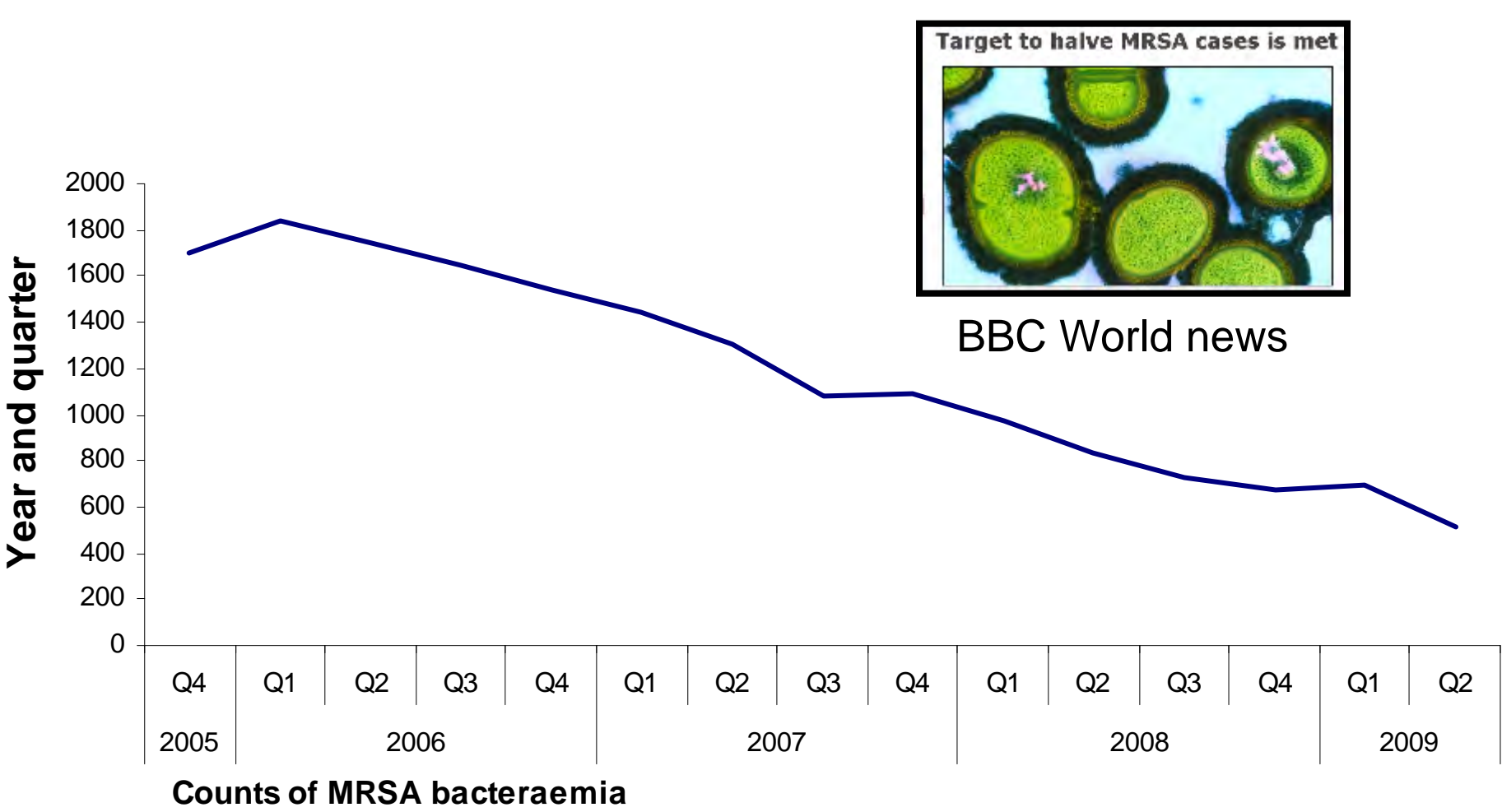
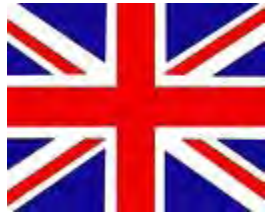




*Can we manipulate  
this trend ?*



# Counts of MRSA bacteraemia Oct 2005 to June 2009



BBC World news

Courtesy: A. Pearson (HPA, Sept 2009)

# Most important determinants of success?

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## **B. Cookson:**

- Changes in legislation to reinforce Code of Practice
- Involvement of all HCW in IC
- Huge resources available

## **A. Holmes:**

- External reinforcement
- Corporate responsibility and leadership
- Improvements: Contact isolation, environmental control, hand hygiene



# Conclusions

- Active MRSA control implemented in many European countries
  - Differences in national strategies
- MRSA rates have decreased or stabilized in many countries:
  - UK, France, Belgium, Austria, Slovenia, Germany, Finland, Denmark

# Any lessons to be learned ?

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- Changes in:
  - Process of care & organizational issues
  - Resources & political commitment
- Targeted screening & isolation
- Improved basic infection control
  - Effective hand hygiene practices
  - Prevention of CVC-related sepsis

## Editorial

# Control of Nosocomial Methicillin-Resistant *Staphylococcus aureus*: Where Shall We Send Our Hospital Director Next Time?

Stephan Harbarth, MD, MS; Didier Pittet, MD, MS

**“We are convinced that there is no level of MRSA prevalence for which active control measures are not warranted.”**