
*HAI control:
what efforts are needed and
what are the benefits:
the Dutch experience*

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Overview

- organisation of infection control in The Netherlands
 - the Dutch policy for MRSA
 - the Dutch policy for highly resistant microorganisms (HRMO)
 - hospital acquired infections in the Netherlands: prevalence and resistance
 - elements of success
-

Organisation of infection control in The Netherlands

- Hospital level:
 - ± 1 infection control practitioner/250 beds
 - ± 1 medical microbiologist/ 1000 beds
 - Infection control committee
 - Antibiotic policy committee
 - National level: guidelines
 - Workingparty on Infection Control (WIP)
 - Workingparty on Antibiotic Policies (SWAB)
 - Dutch Society of Medical Microbiology
 - Health Inspectorate
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Organisation of infection control in The Netherlands: what we think is needed:

- ± 1 infection control practitioner/36 364 patient days (1/ 178 beds)
- ± 1 medical microbiologist/ 164 706 patient days (1/ 806 beds)

➤ *Van den Broek P.J. et al, J. Hosp. Inf. 2007, 65: 108*

Table 1 Time needed for the tasks of infection control practitioner and medical microbiologist

Task	Time needed (h)					
	Infection control practitioner (N = 15)			Medical microbiologist (N = 9)		
	Mean	Median	Range	Mean	Medium	Range
Surveillance	29.5	28	24–48	4	4	0.5–9
Committee work	13	12	5–30	4.7	5	4–5
Accessibility and availability out of working hours	17.7	9	0–58	0.7	0.5	0.15–2
Keeping up-to-date by postgraduate courses, taking note of new products, procedures, policies, literature	18.9	18	10–26	5.4	6	3–8
Teaching	11.6	12	8–16	1.9	2	1–4
Development, implementation of guidelines and protocols	17.8	16	15–24	3.4	4	2–5
Audits and other activities to evaluate guidelines and protocols	20.4	17	14–35	2.1	2	1–4
Counselling and consultation (structural and <i>ad hoc</i>)	41	40	12–80	5.7	4	3–12
Outbreak management	11.1	12	3–28	6.6	5	3–12
Activities in relation to (multi) resistant micro-organisms (e.g., MRSA)	16.9	15	4–45	2.4	2	0.5–6
Activities in relation to reportable diseases (e.g., tuberculosis)	0.9	1	0–2	0.6	0.5	0.05–1.5
External consultation and counselling	5.3	5.5	0–12.5	1.6	1.6	0.3–5
Other activities	42.4	40.8	17–97.4	15	12	7–30.2
Total	242.1	226	177.3–348.9	53.8	48.7	39.2–74.2

The Dutch policy for HA-MRSA

Key elements:

- isolation (quarantine) and screening on admission of high risk groups:
 - patients transferred from foreign hospitals
 - patients from Dutch hospitals or nursing homes with MRSA problem
 - patients who work on pig farms
 - every case of MRSA (carriage or infection): strict isolation
 - private room, gowns, masks, caps, gloves
 - hand disinfection with alcoholic hand rub
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The Dutch policy for HA-MRSA

Key elements:

- if unexpected case of MRSA
 - strict isolation
 - screening of contact patients and healthcare workers
 - if more cases: no new admissions to affected wards → isolation wards
 - carriers among health care workers → off duty and treated for carriage
 - treatment of carriage (patients and health care workers) with nasal mupirocin
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The Dutch policy for HA-MRSA

- ✓ national guideline by WIP (Workingparty on Infection Prevention)
 - ✓ national detection guideline by NVMM (Dutch Society of Medical Microbiology)
 - ✓ national guideline for treatment of carriage by SWAB (Working Party on Antibiotic Policy)
 - ✓ national surveillance by RIVM (National Institute of Public Health & Environmental Protection)
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The Dutch policy for highly resistant microorganisms (HRMO)

WIP guidelines for HRMO (2005)

- definition:

Enterobacteriaceae	ESBL	Quinolones	Amino glycosides	Carba penem	Cotrim oxazole
<i>Escherichia coli</i>	A	B	B	A	n.a.
<i>Klebsiella spp.</i>	A	B	B	A	n.a.
Other	A	B	B	A	B

A = resistance → indication for isolation

B = resistance to at least two of "B" groups → indication for isolation

n.a. = not applicable

WIP guidelines for HRMO (2005)

- definition:

Non-fermenters	Ceftazidime	Quinolones	Aminoglycosides	Carbapenem	Cotrimoxazole
<i>Acinetobacter spp.</i>	B	B	B	A	n.a.
<i>Stenotrophomonas maltophilia</i>	n.a.	n.a.	n.a.	n.a.	A
Other (including <i>Pseudomonas aeruginosa</i>)	C	C	C	C	n.a.

- A = resistance → indication for isolation
- B = resistance to at least two of "B" groups → indication for isolation
- C = resistance to at least three of "C" groups → indication for isolation

WIP guidelines for HRMO (2005)

- definition:

Gram-positive bacteria	Penicillin group	Vancomycin
<i>Streptococcus pneumoniae</i>	A	A
<i>Enterococcus faecium</i>	B	B

A = resistance → indication for isolation

B = resistance to at least two of "B" groups → indication for isolation

WIP guidelines for HRMO (2005)

- detection:
 - specifically in patients who are admitted to high-risk departments and who:
 - ✓ have been treated in foreign hospitals
 - ✓ come from other Dutch hospitals with an actual problem with HRMO
 - ✓ have been in contact with a patient with HRMO
 - isolation: not only infected, but also colonised patients
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WIP guidelines for HRMO (2005)

- form of isolation:

Microorganism	Nursing department, including Intensive Care	Epidemic/outbreak
<i>Enterobacteriaceae</i>	contact	contact/droplet in single-patient room or cohort
<i>Acinetobacter</i> species	strict	strict
<i>Stenotrophomonas maltophilia</i>	contact	contact/droplet in single-patient room or cohort
Other non-fermenters (including <i>Pseudomonas aeruginosa</i>)	contact	contact/droplet in single-patient room or cohort
<i>Streptococcus pneumoniae</i>	contact/droplet in single-patient room	contact/droplet in single-patient room or cohort
<i>Enterococcus faecium</i>	contact in single-patient room	contact in single-patient room or cohort

WIP guidelines for HRMO (2005)

also list:

- indications for contact investigation
 - precautions for examination and treatment
 - actions in the event of an outbreak
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Prevalence of nosocomial infections in The Netherlands

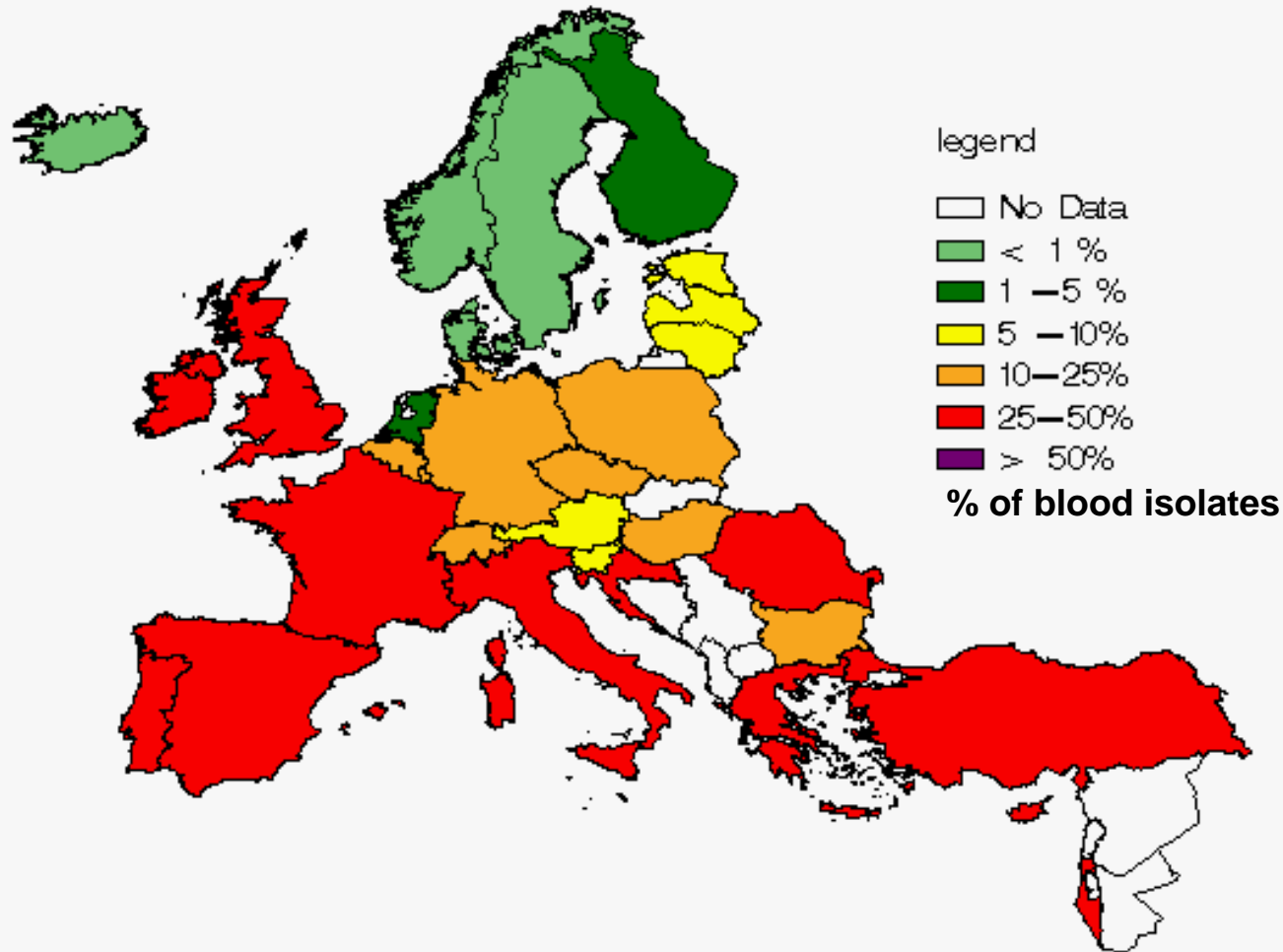
- Since 2006, prevalence survey twice a year
 - Voluntary participation
 - Performed by PREZIES: Dutch acronym for “prevention of nosocomial infections through surveillance”, a cooperation between the Dutch Institute for Healthcare Improvement (CBO) and the National Institute for Public Health and the Environment (RIVM)
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Prevalence of nosocomial infections in The Netherlands – March 2007

	number	%	95% C.I.
hospitals	30		
patients	8424		
patients with nosocomial infection	579	6.9	6.4 – 7.4
nosocomial infections	665	7.9	7.3 – 8.5

Proportion of MRSA isolates in participating countries in 2007

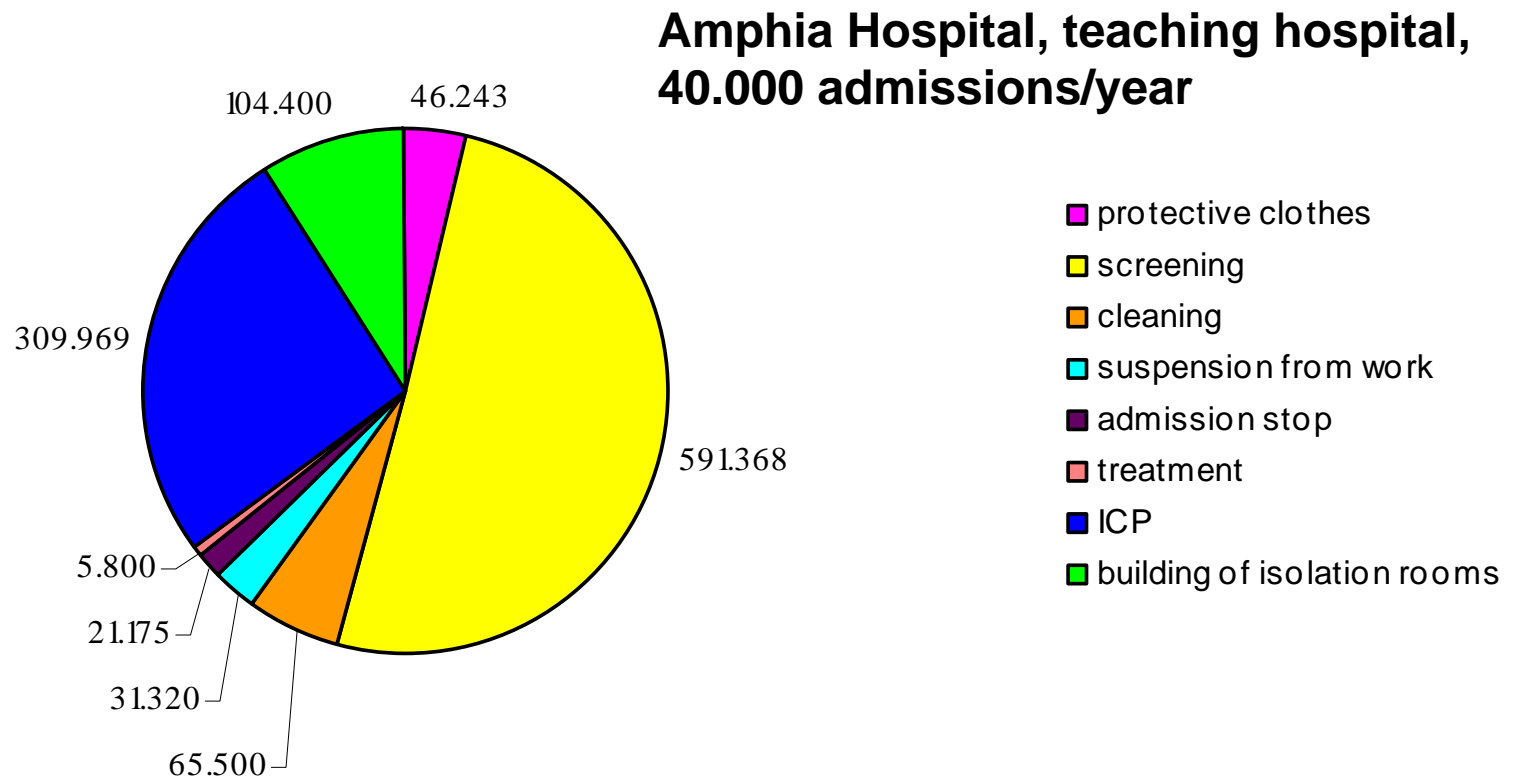
(c) EARSS



MRSA / 2007

<http://www.rivm.nl/earss/database/>

Costs and benefits: MRSA policy 2001 - 2006



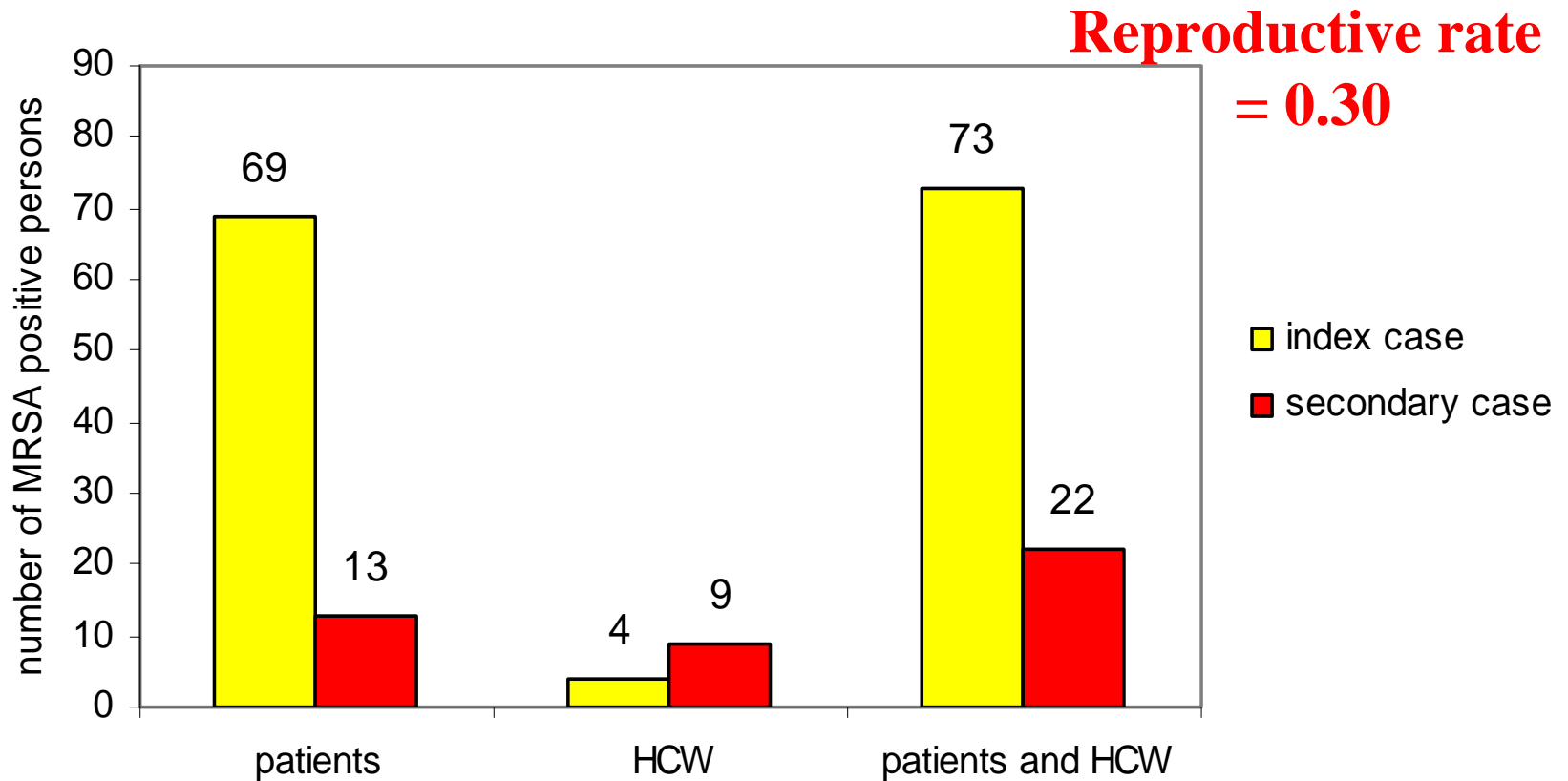
Total costs were estimated at € 1,320,000

= € 220,000/year

= € 0.78 per patient day = 0.08% of hospital budget

Amphia Hospital, Breda – Kluytmans & van Rijen (ICAAC 2008)

MRSA: Amphia 2001-2006 incidence and transmission



Benefits: MRSA policy 2001 - 2006

- Benefits = costs of avoided MRSA bacteremias
- No MRSA bacteremia over 6-year period
- How many avoided? Assumptions
 - If no control of MRSA:
 - 50% of *S. aureus* bacteremia = MRSA
 - MRSA bacteremia would add up to MSSA bacteremia
- 36 MSSA bacteraemias/year over study period
 - 36 MRSA bacteremias avoided

Benefits: MRSA policy 2001 - 2006

- Benefits
= costs of 36 avoided MRSA bacteremias
- Costs of 1 bacteremia caused by MRSA =
~ € 12,000 (Cosgrove et al, ICHE 2005)
- Annual savings estimated at € 432,000

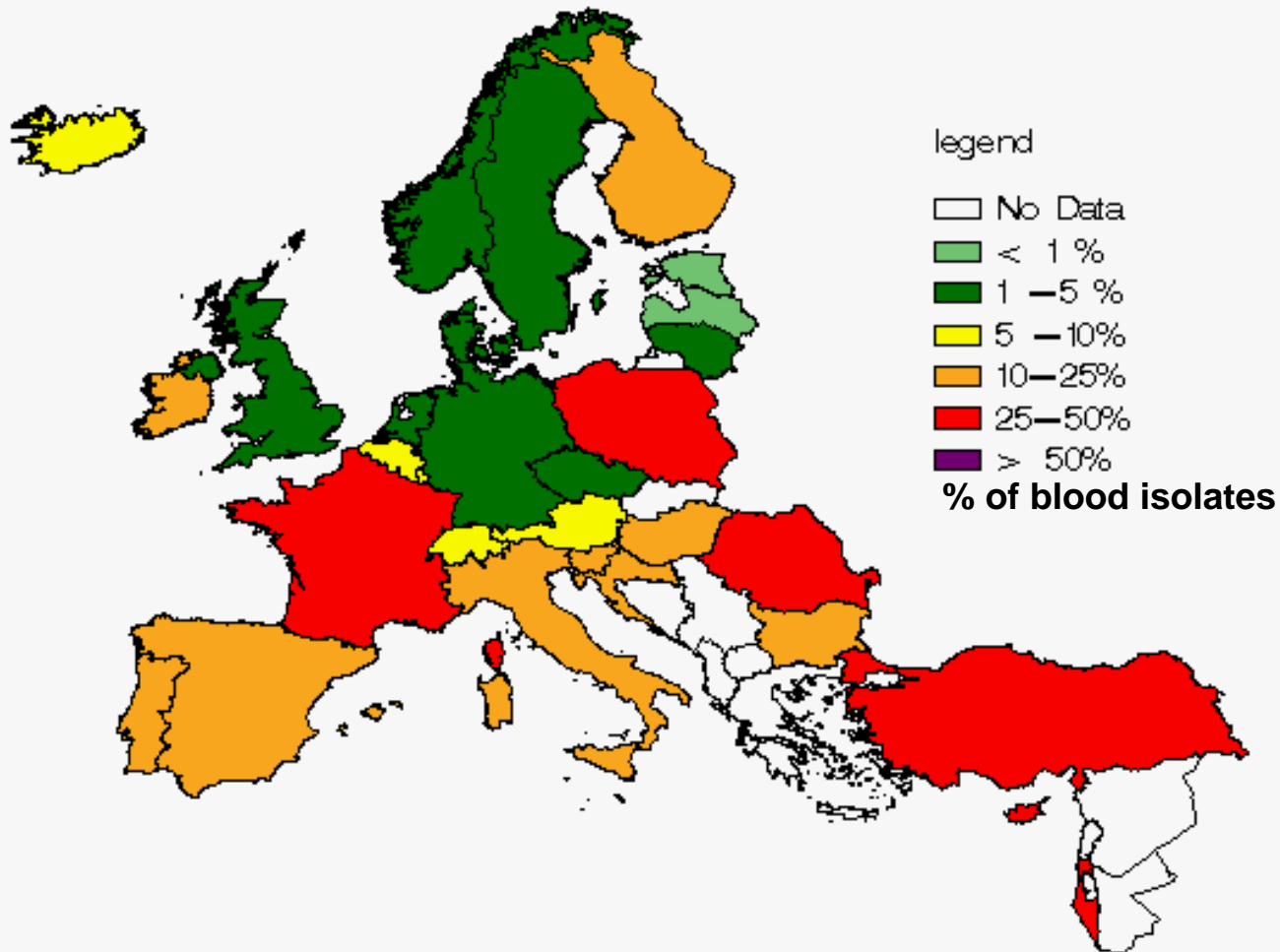
Savings	= € 432,000
Costs	= € 220,000
Total savings	= € 212,000/year

Costs and benefits MRSA policy 2001 - 2006

- € 0.78 per patient day of stay
- Not a single case of MRSA bacteremia over 6-year period

Proportion of PNSP isolates in participating countries in 2007

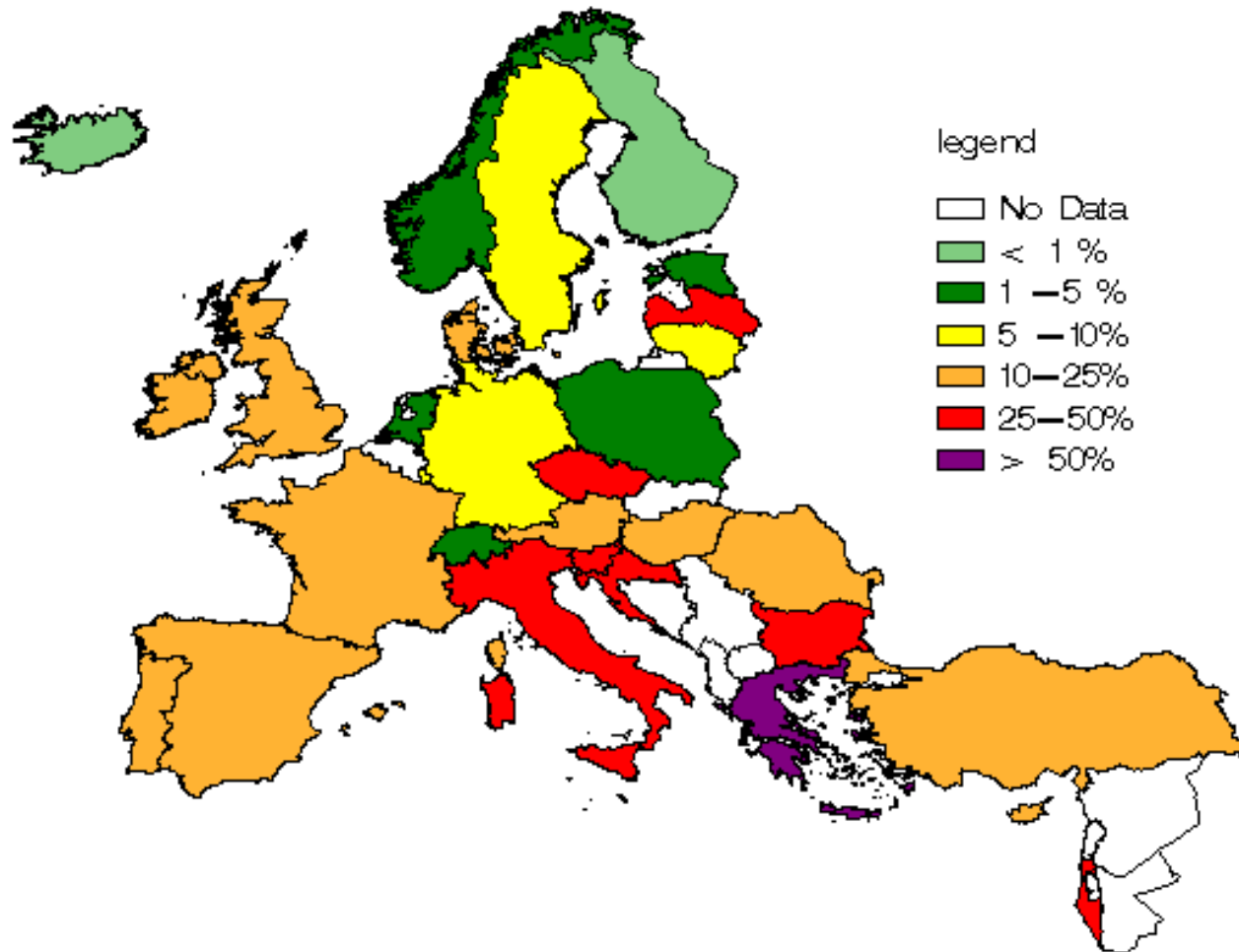
(c) EARSS



***Streptococcus pneumoniae*, not susceptible to penicillin (PNSP)**

<http://www.rivm.nl/earss/database/>

Proportion of Fluoroquinolones resistant *K. pneumoniae* isolates in participating countries in 2007
(c) EARSS



***Klebsiella pneumoniae*, resistant to fluoroquinolones**

A map of the Netherlands, showing the country's geographical outline in a light blue color against a white background. The map is centered on the page.

The Netherlands: a green resistance country

Three elements of success

1) Infection control

- ✓ national guidelines
 - ✓ early detection of and reaction to resistant microorganisms
 - ✓ resources for detection of resistant microorganisms and for isolation measures (financial and personnel)
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**Stichting
Werkgroep
Infectie
Preventie**

www.wip.nl



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The WIP-website has changed! [Read the g](#)

Dutch Workingparty on Infection Prevention (WIP)

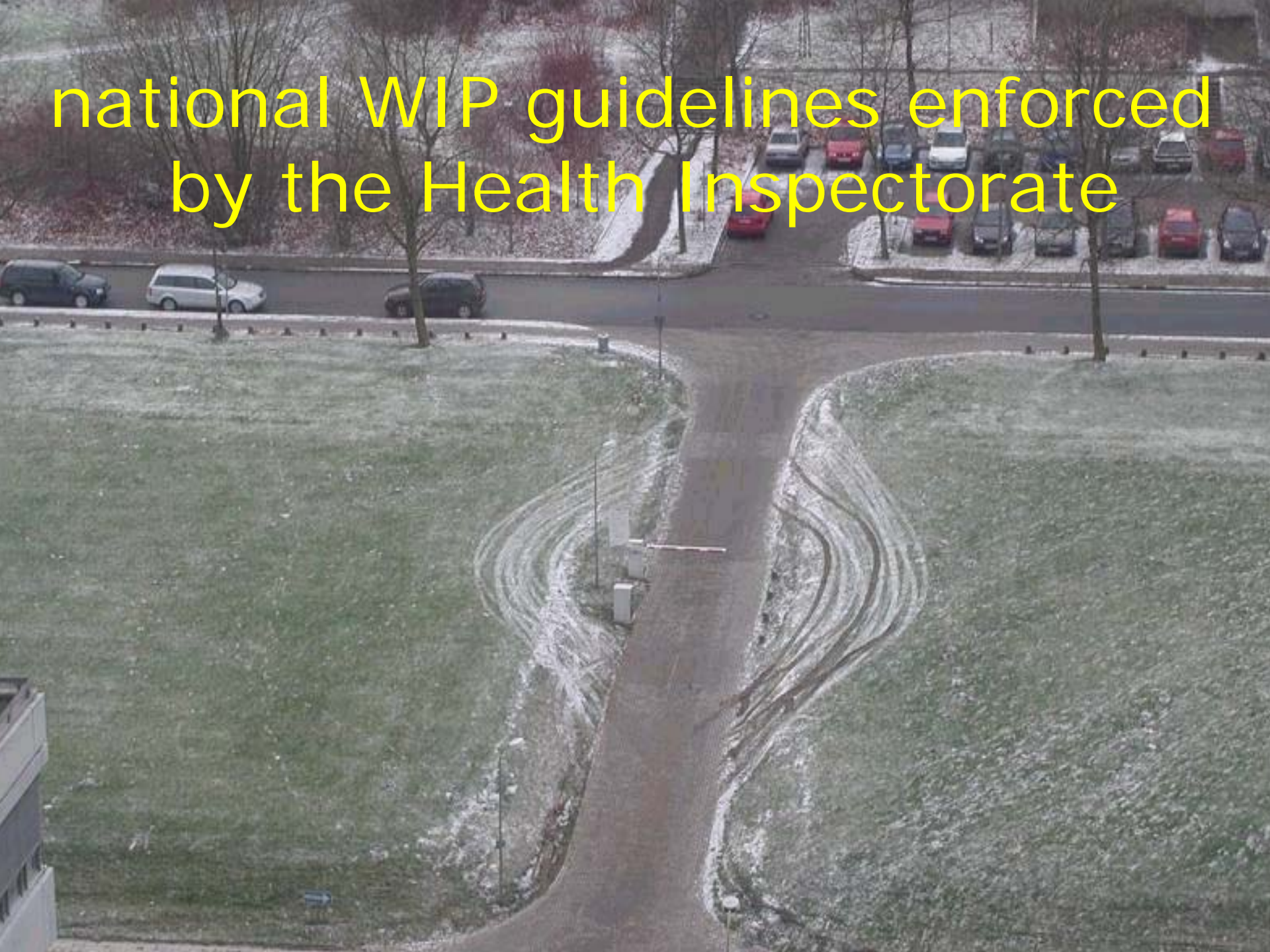
In 1981 the WIP was founded to stimulate infection prevention in the Netherlands. Professionals from four Dutch societies are participating in this working party:

- The Infectious Diseases Society of the Netherlands and Flanders
- The Dutch Society of Medical Microbiology
- The Dutch Society of Microbiology
- The Society for Hygiene and Infection Prevention in Health Care

The aim is to develop and publish scientific data, scientifically based guidelines



national WIP guidelines enforced
by the Health Inspectorate



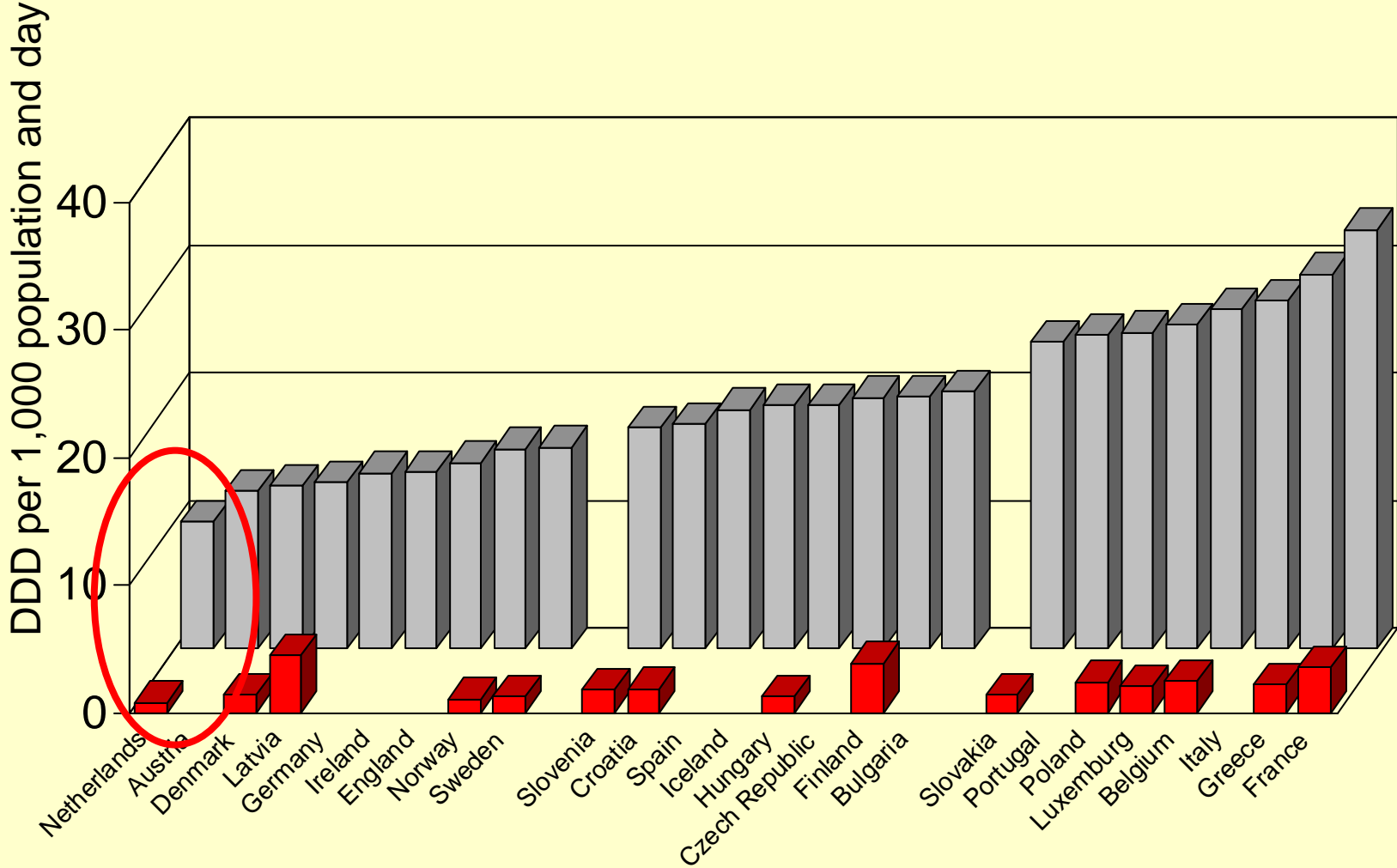
Three elements of success

1) Infection control

- ✓ early reaction at first appearance of resistant microorganisms
- ✓ resources for detection of resistant microorganisms and for isolation measures
- ✓ national isolation guidelines

2) Enforcement of guidelines by Health Inspectorate

Antibiotic Use per Population: Outpatients vs. Hospital



Source: ESAC 2001

Three elements of success

1) Infection control

- ✓ early reaction at first appearance of resistant microorganisms
- ✓ resources for detection of resistant microorganisms and for isolation measures
- ✓ national isolation guidelines

2) Enforcement of guidelines by Health Inspectorate

3) Parsimonious use of antibiotics

Conclusions

- Large organisational effort, nationwide and local
 - For MRSA: cost-effective
 - Reasonable prevalence of health-care associated infections
 - Very favourable resistance patterns
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