

Incidence and Prevalence of AROs in Health Facilities and in the Community

A Global Perspective



AROs Conference
Calgary, Canada
18 of June 2014

Antimicrobial Resistant Organisms

“Bacteria capable of causing human disease that are resistant to one or more classes of antibiotics.”

Treatment failure

Complications

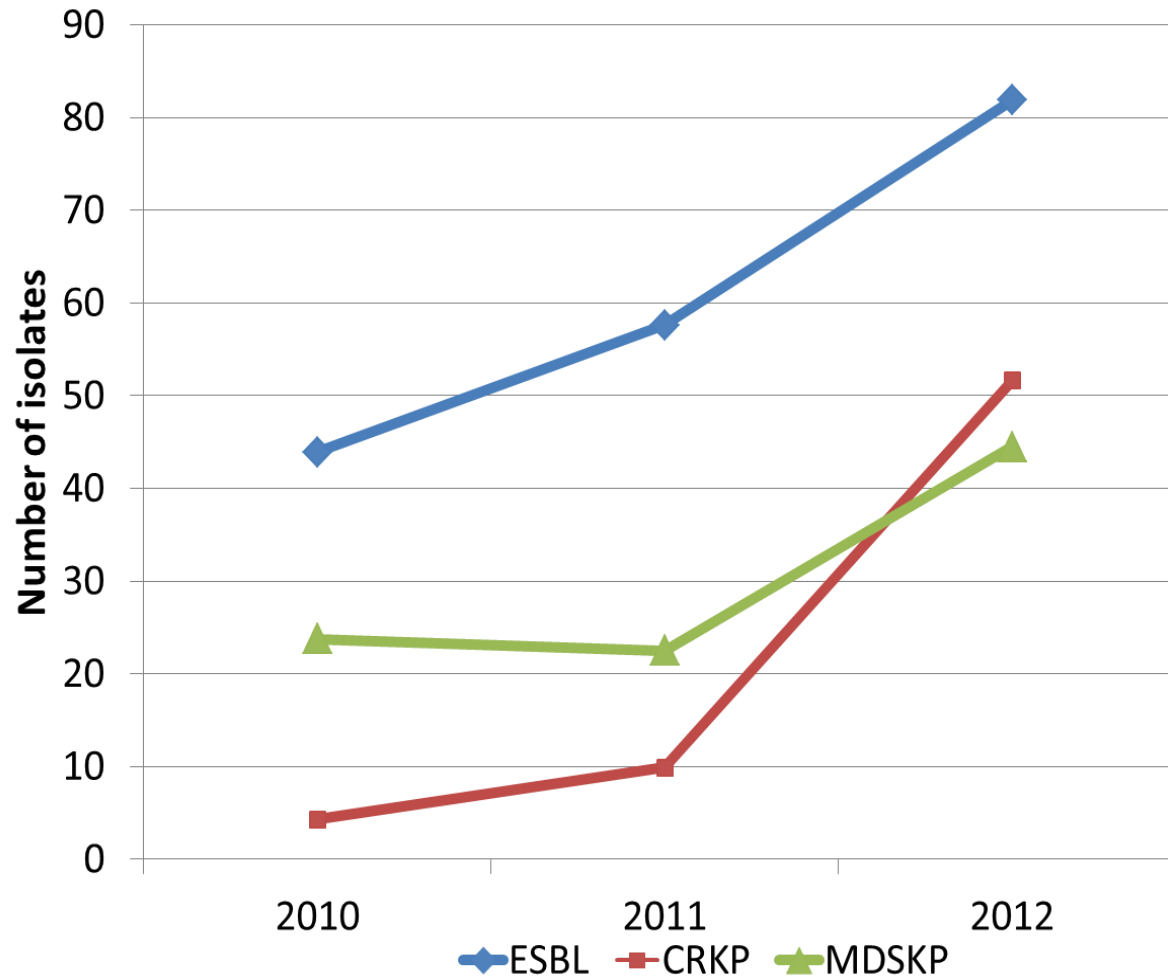
Prolonged
hospital
stay

Increase
risk of
death

Neonatal outbreaks 2013 and MDRO



K. pneumoniae isolates QEH, 2010-2012*

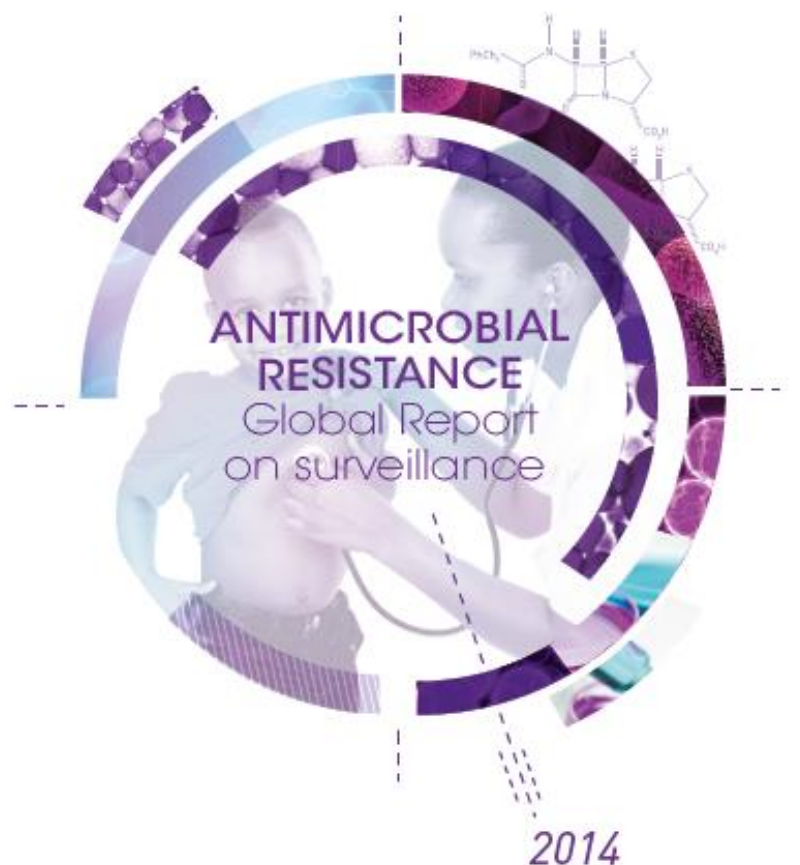


* Jan-Sep

Now facing a global public health crisis



Magnitude of the problem? Burden? Surveillance status?
Healthcare impact? Economic impact?
... **From a global perspective**



Data on **114** countries

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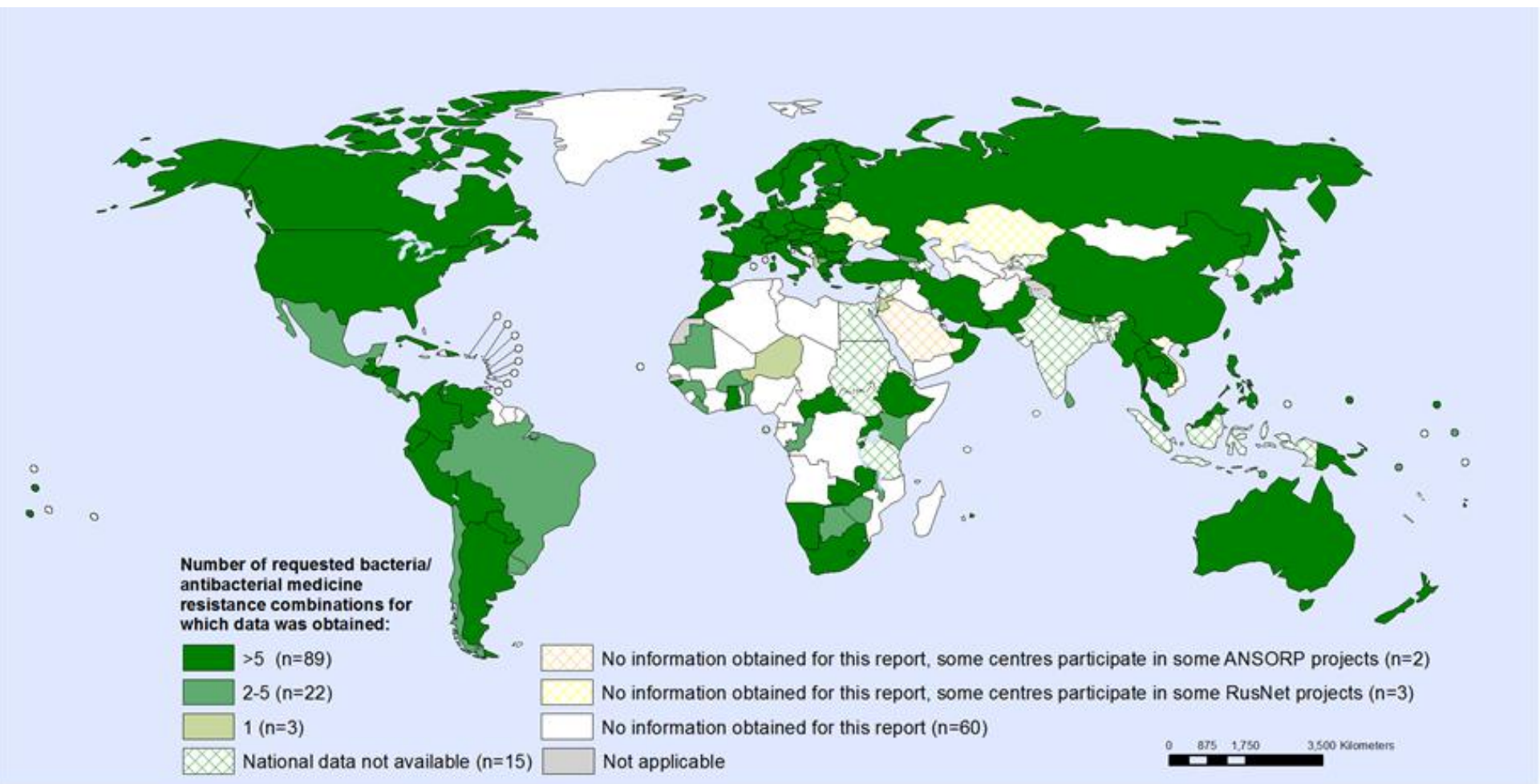
<http://www.who.int/drugresistance/documents/surveillancereport/en/>



Selected bacteria/ resistance combinations

<u>Bacterium</u>	<u>Resistance/decreased susceptibility to</u>
<i>Escherichia coli</i>	3 rd generation cephalosporins, fluoroquinolones
<i>Klebsiella pneumoniae</i>	3 rd generation cephalosporins, carbapenems
<i>Staphylococcus aureus</i>	Methicillin (β - lactam antibiotics) i.e. MRSA
<i>Streptococcus pneumoniae</i>	Penicillin
Non-typhoidal <i>Salmonella</i>	Fluoroquinolones
<i>Shigella</i> species	Fluoroquinolones
<i>Neisseria gonorrhoeae</i>	3 rd generation cephalosporins

Availability of national data* on resistance for 9 selected bacteria–antibacterial drug combinations, 2013



The boundaries and names shown and the designations used on this map do not imply the expression of any opinion whatsoever on the part of the World Health Organization concerning the legal status of any country, territory, city or area or of its authorities, or concerning the delimitation of its frontiers or boundaries. Dotted and dashed lines on maps represent approximate border lines for which there may not yet be full agreement.

Data Source: World Health Organization
Map Production: Health Statistics and Information Systems (HSI)
World Health Organization



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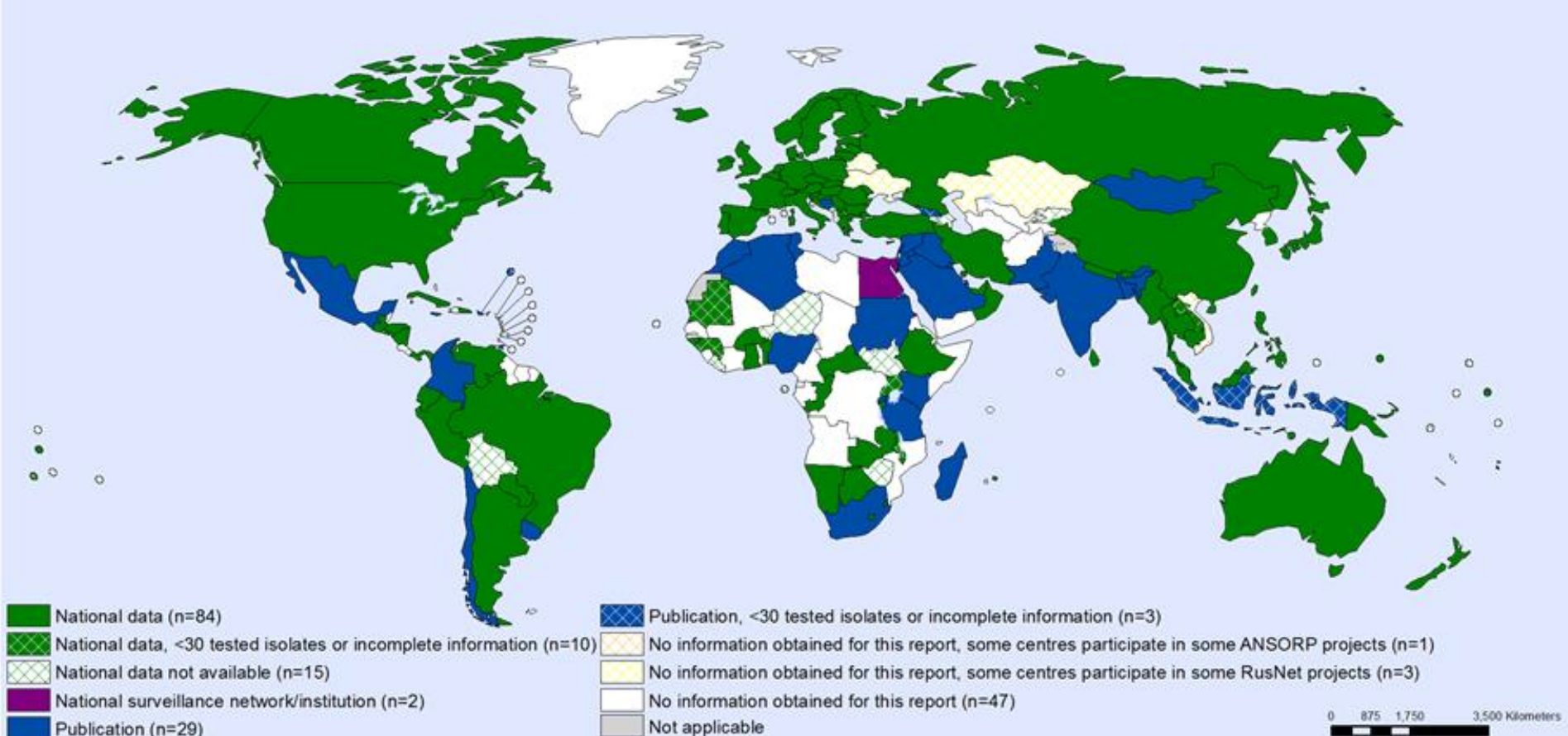
*National data means data obtained from official sources, but not that data necessarily are representative for the population or country as a whole

Escherichia coli:

Resistance to third-generation cephalosporins

Sources and availability of data

* Most recent data as reported 2013 or published 2008-April 2013



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Escherichia coli:

Resistance to third-generation cephalosporins

	Reported range of resistance (%)*	
	National data	Published data**
African Region	2–70	0–87
Region of the Americas	0–48	0–68
Eastern Mediterranean Region	22–63	2–94
European Region	3–82	0–8
South- East Asian Region	16–68	19–95
Western Pacific Region	0–77	8–71

* Based on at least 30 tested bacterial isolates

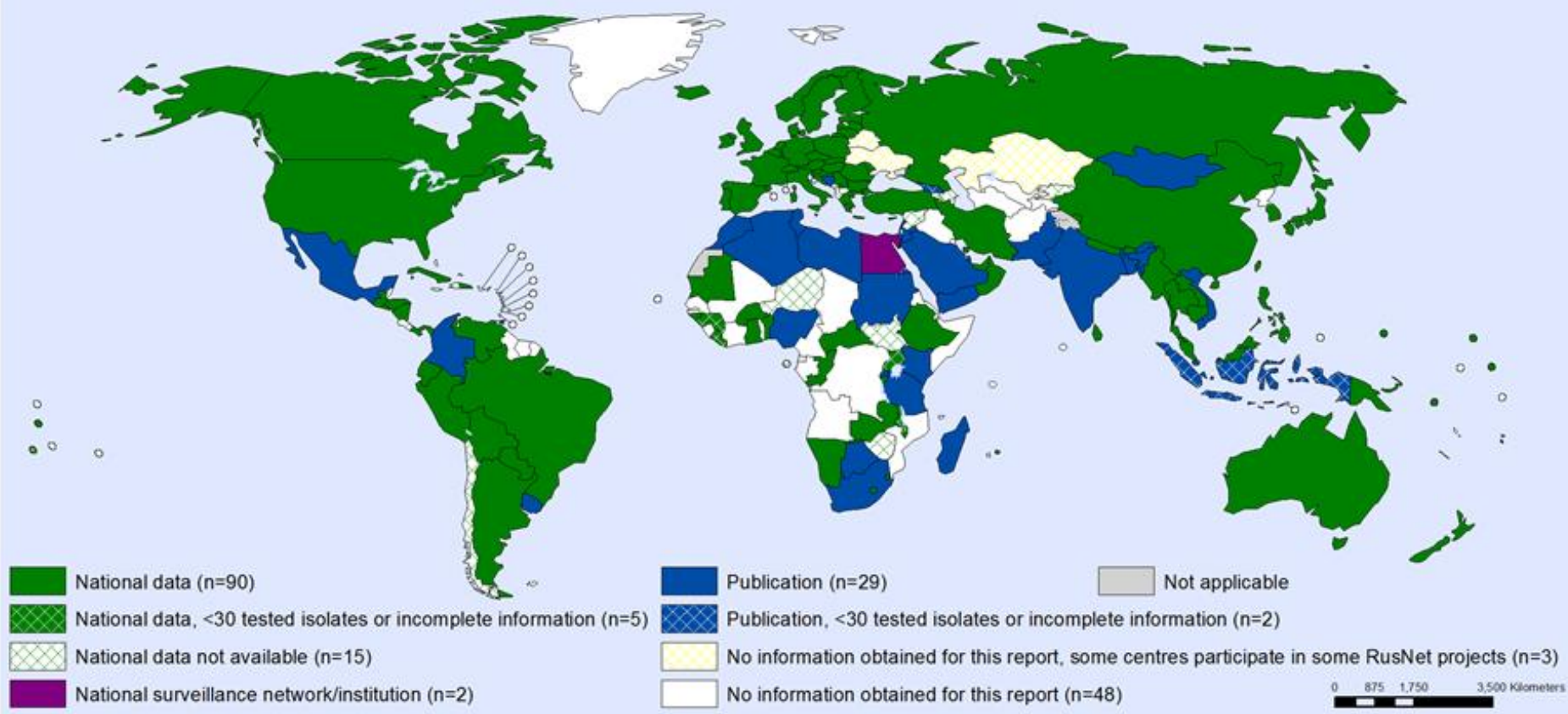
** Publication data are complementary to national data, not from the same countries

Escherichia coli:

Resistance to fluoroquinolones

Sources and availability of data

* Most recent data as reported 2013 or published 2008-April 2013



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Escherichia coli:

Resistance to fluoroquinolones

	Reported range of resistance (%)*	
	National data	Published data**
African Region	14–71	0–98
Region of the Americas	8–58	2–60
Eastern Mediterranean Region	21–62	0–91
European Region	8–48	0–18
South- East Asian Region	32–64	4–89
Western Pacific Region	3–96	0.2–65

* Based on at least 30 tested bacterial isolates

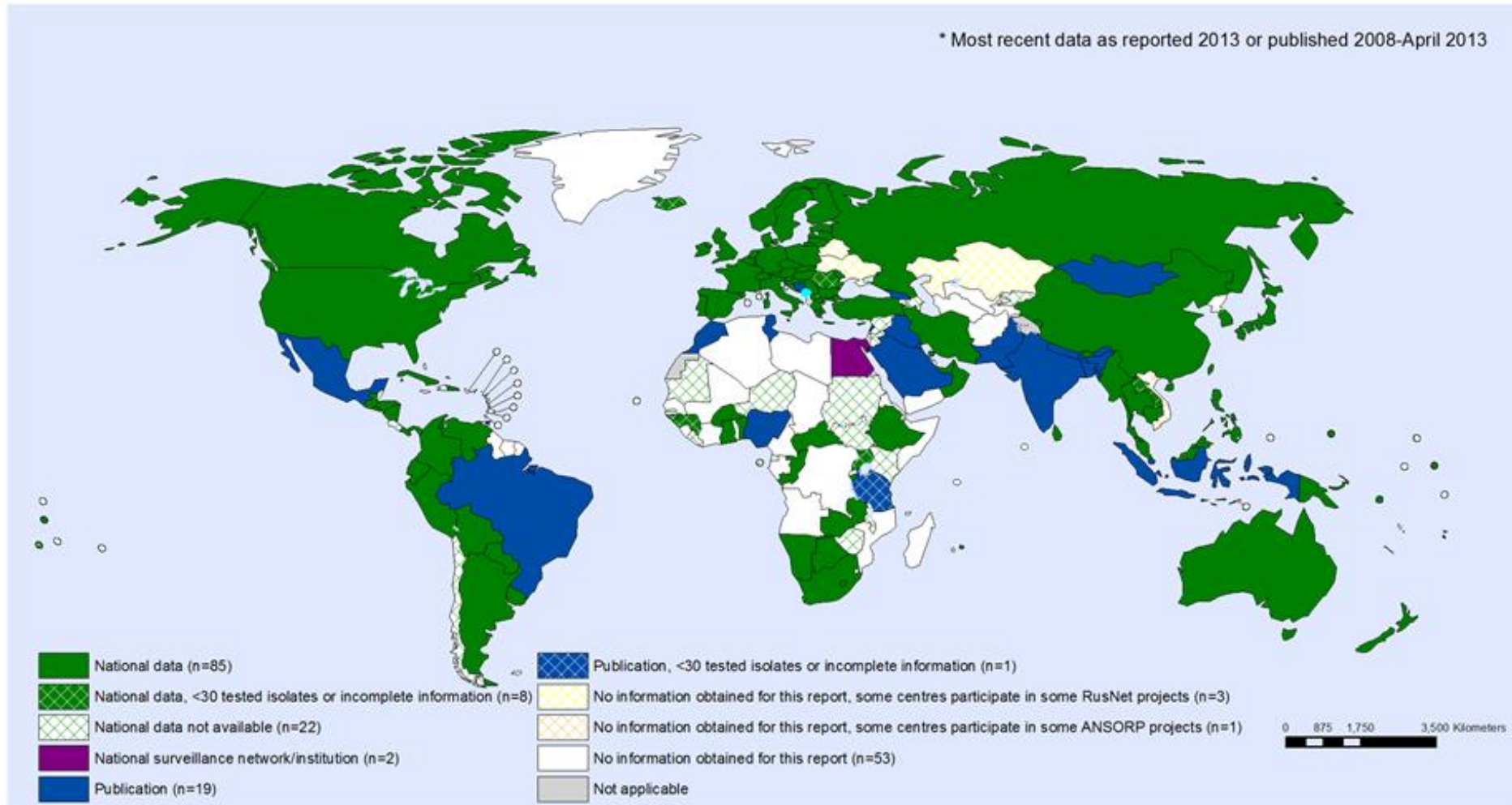
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Klebsiella pneumoniae:

Resistance to third-generation cephalosporins

Sources and availability of data

* Most recent data as reported 2013 or published 2008-April 2013



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Klebsiella pneumoniae: Resistance to third-generation cephalosporins

	Reported range of resistance (%)*	
	National data	Published data**
African Region	8–77	9–69
Region of the Americas	4–71	15–56
Eastern Mediterranean Region	22–50	6–75
European Region	2–82	4–61
South- East Asian Region	34–81	5–100
Western Pacific Region	1–72	27–35

* Based on at least 30 tested bacterial isolates

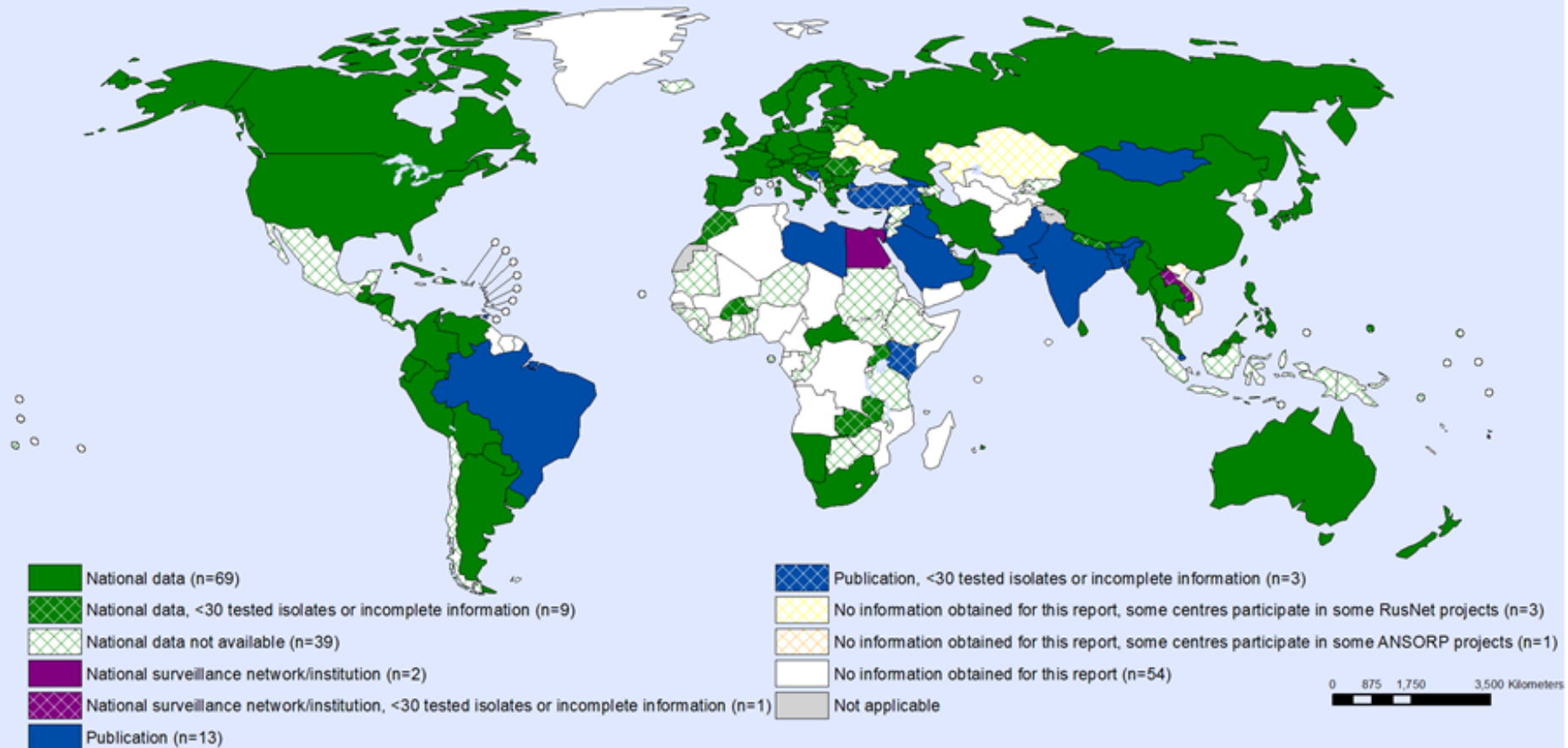
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Klebsiella pneumoniae:

Resistance to carbapenems

Sources and availability of data

* Most recent data as reported 2013 or published 2008-April 2013



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Klebsiella pneumoniae: Resistance to carbapenems

	Reported range of resistance (%)*	
	National data	Published data**
African Region	0–4	-
Region of the Americas	0–11	0–2
Eastern Mediterranean Region	0–54	0–21
European Region	0–68	2–7
South- East Asian Region	0–8	0–55
Western Pacific Region	0–8	0–11

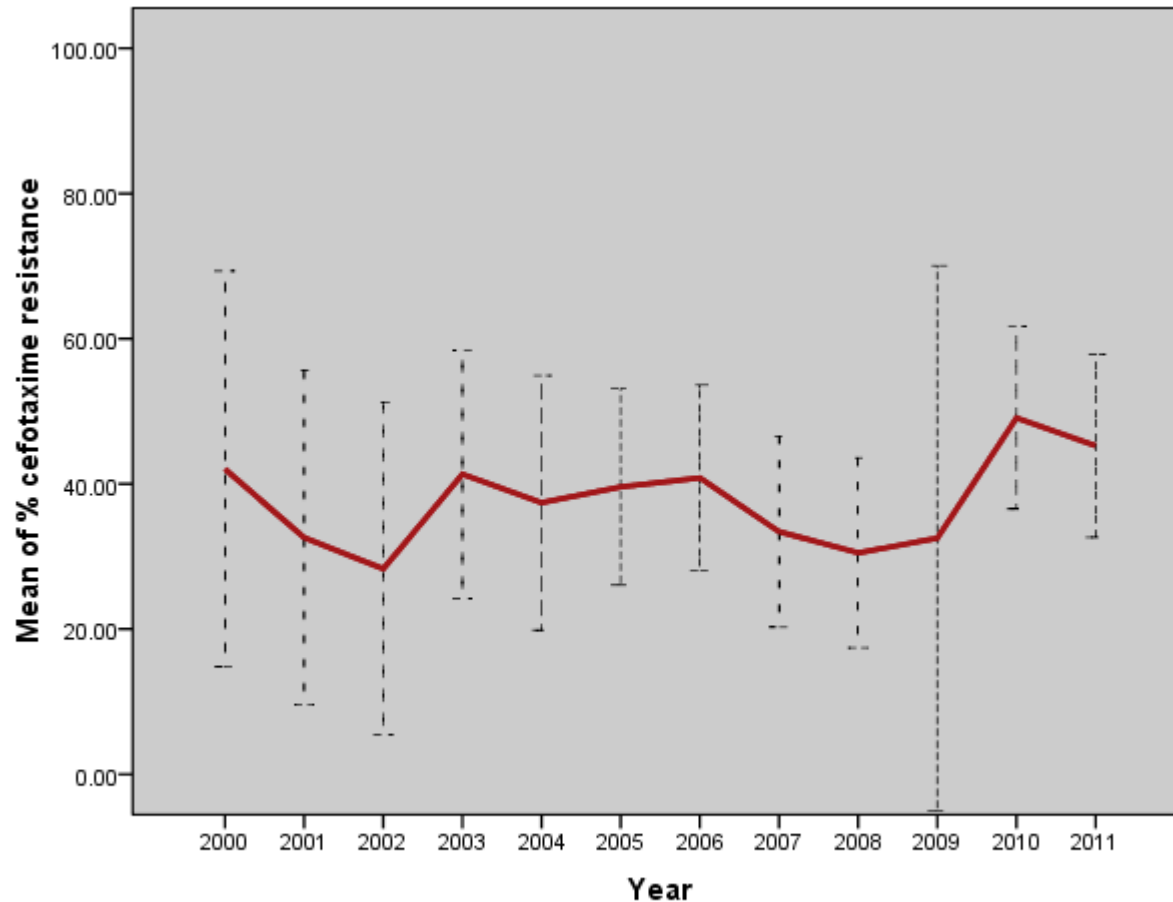
* Based on at least 30 tested bacterial isolates

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Klebsiella spp

Cefotaxime Resistance Trend, 2000-2011

Latin America AMR Surveillance Network

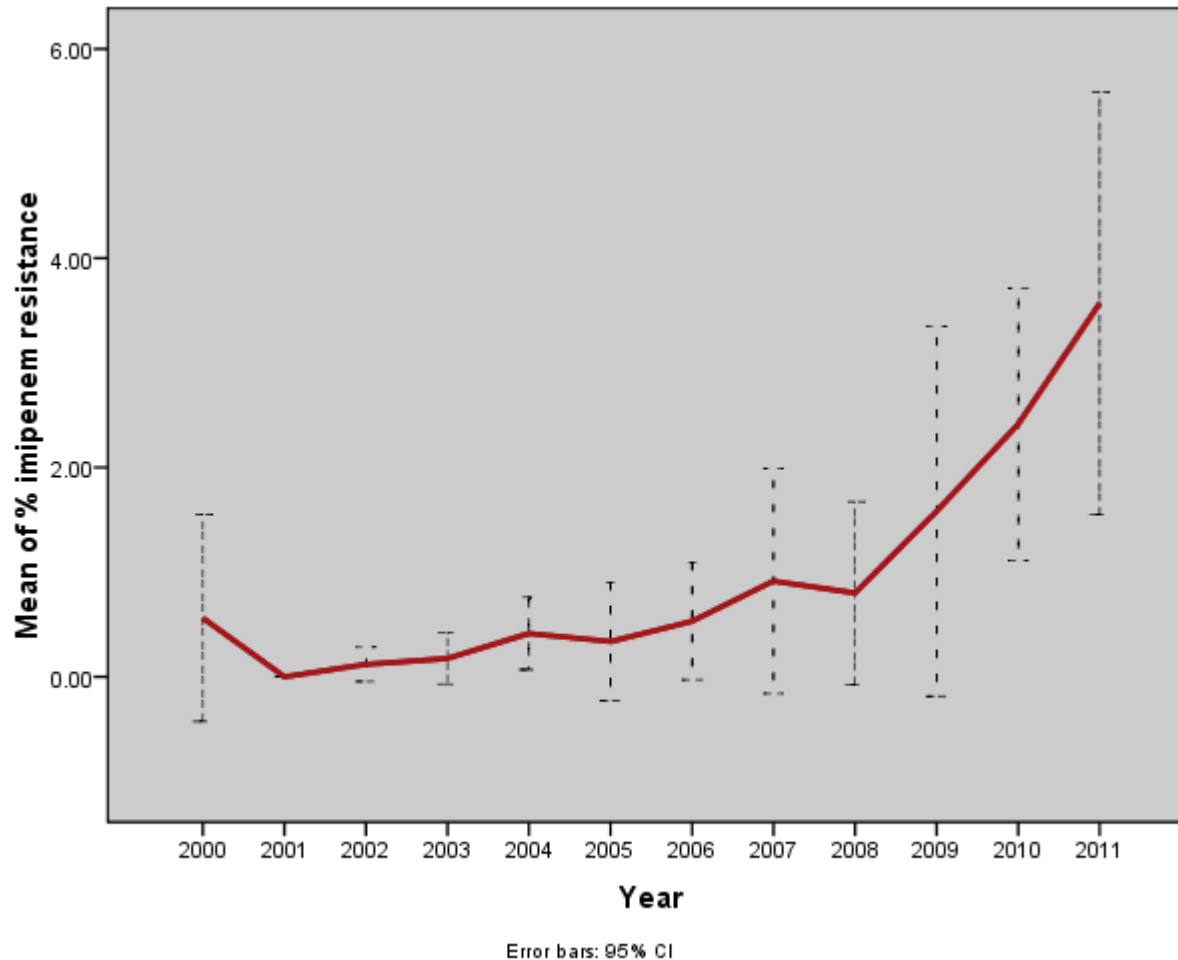


Error bars: 95% CI

Klebsiella spp

Imipenem Resistance Trend, 2000-2011

Latin America AMR Surveillance Network





NDM and KPC Carbapenemases in Enterobacteriaceae 2013

Source: Latin American Surveillance
Network + Literature review

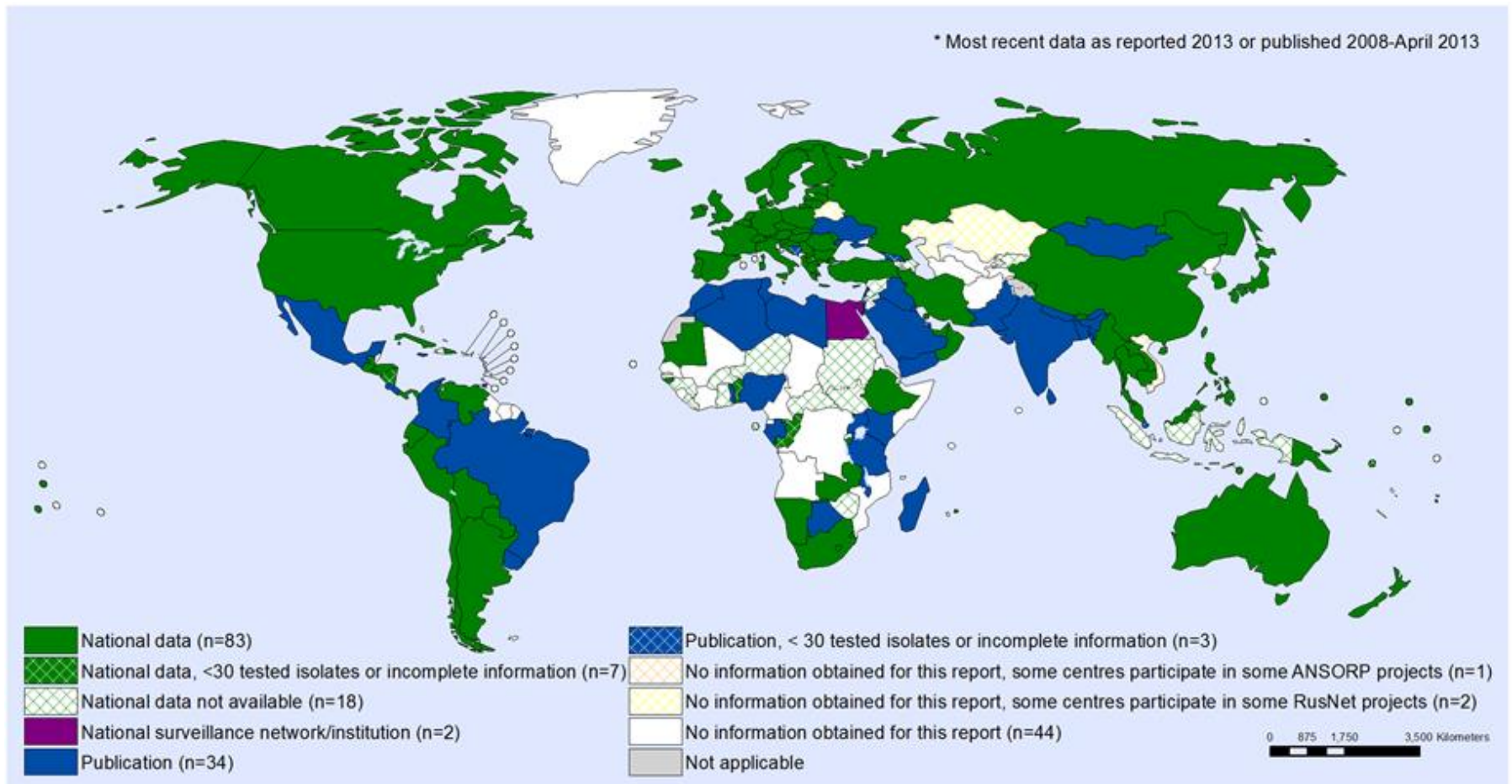


World Health
Organization

Staphylococcus aureus:

Resistance to beta-lactam antibacterials (i.e. methicillin-resistant *S. aureus*, MRSA)

Sources and availability of data



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Staphylococcus aureus:

Resistance to beta-lactam antibacterials (i.e. methicillin-resistant *S. aureus*, MRSA)

	Reported range of resistance (%)*	
	National data	Published data***
African Region	12–80	0–100
Region of the Americas	21–90	2–90
Eastern Mediterranean Region	10–53	0–92
European Region	0.3–60	27–80
South- East Asian Region	10–26	2–81
Western Pacific Region	4–84	60

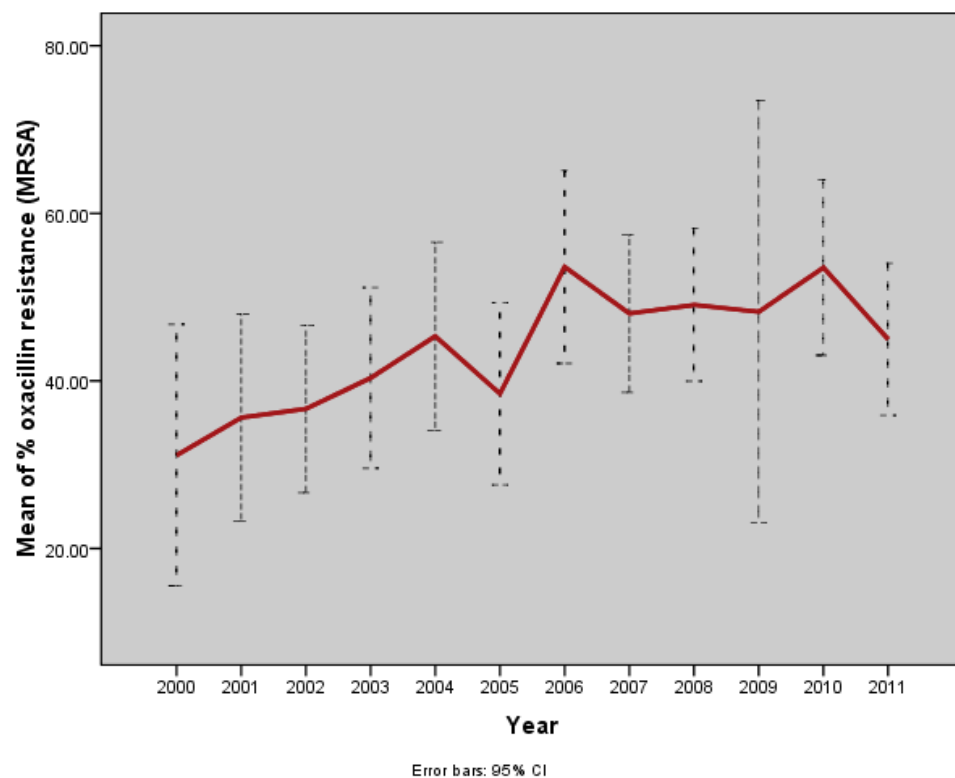
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Methicillin Resistant *Staphylococcus aureus*

(hospital isolates)

Latin America AMR Surveillance Network, 2000 - 2011



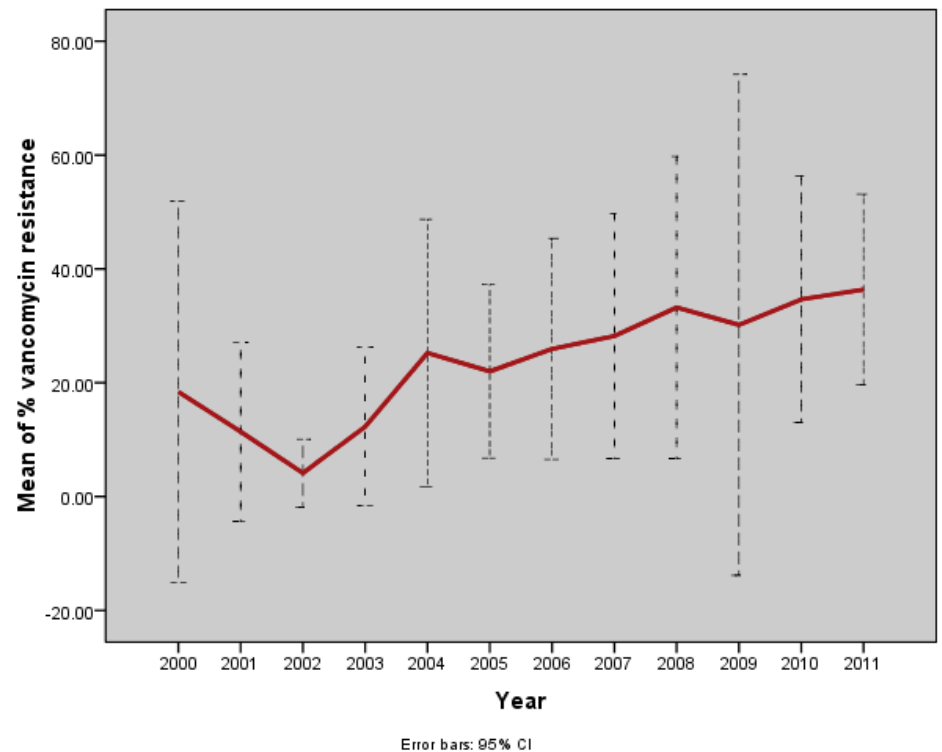
Enterococcus faecium vancomycin resistant

Latin America AMR Surveillance Network



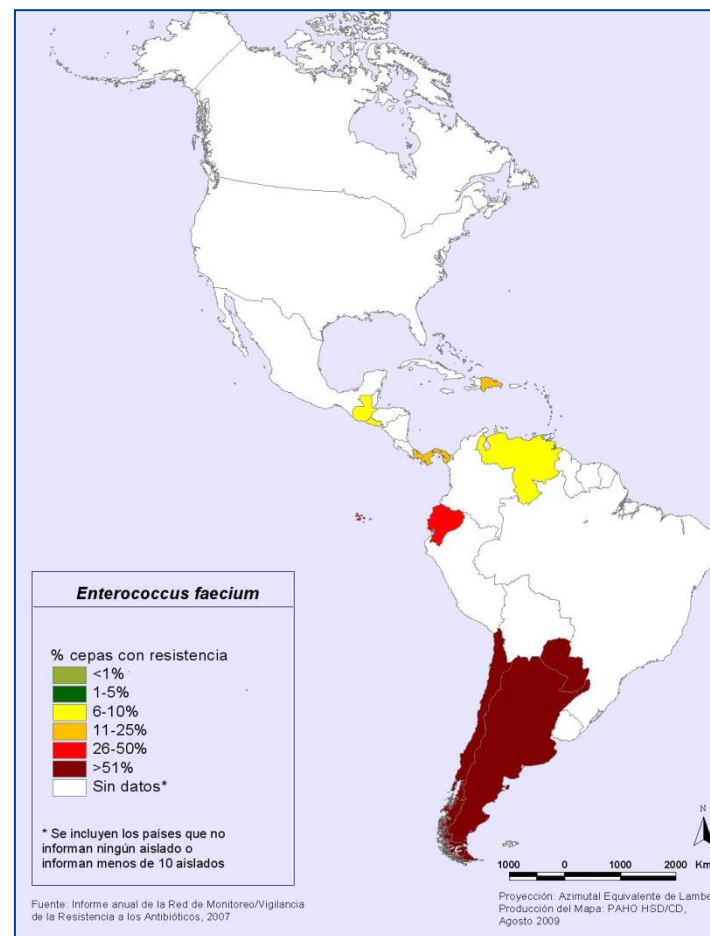
VRE Outbreak
Asuncion, Paraguay, 2008

Trend 2000 - 2011



Enterococcus spp

Vancomycin resistance, 2007



In summary: Bacteria commonly causing infections in hospitals and in the community

Name of bacterium/ resistance	Examples of typical diseases	No. out of 194 MS providing data	No. of WHO regions with national reports of 50 % resistance or more
<i>Escherichia coli</i> - vs 3 rd gen. cephalosporins - vs fluoroquinolones	Urinary tract infections, blood stream infections	86 92	5/6 5/6
<i>Klebsiella pneumoniae</i> - vs 3 rd gen. cephalosporins - vs 3 rd carbapenems	Pneumonia, blood stream infections, urinary tract infections	87 71	6/6 2/6
<i>Staphylococcus aureus</i> - vs methicillin "MRSA"	Wound infections, blood stream infections	85	5/6

In summary: Bacteria mainly causing infections in the community

Name of bacterium/ resistance	Examples of typical diseases	No. out of 194 MS providing data	No of WHO regions with national reports of 25 % resistance or more
<i>Streptococcus pneumoniae</i> / - non-susceptible or resistant to penicillin	Pneumonia, meningitis, otitis	67	6/6
<i>Nontyphoidal Salmonella</i> / - vs fluoroquinolones	Foodborne diarrhoea, blood stream infections	68	3/6
<i>Shigella species</i> / - vs fluoroquinolones	Diarrhoea ("bacillary dysentery")	35	2/6
<i>Neisseria gonorrhoea</i> / - vs 3 rd gen. cephalosporins	Gonorrhoea	42	3/6

Conclusions:

AMR is not longer a prediction for the future; its happening now

- AMR is present in all parts of the world. New resistance mechanisms emerge and spread globally
- There are high proportions of antibiotic resistance (ABR) in bacteria that cause common infections (e.g. urinary tract infections, pneumonia, bloodstream infections) in all regions of the world.
- A high percentage of hospital-acquired infections are caused by highly resistant bacteria such as methicillin-resistant *Staphylococcus aureus* (MRSA) or multidrug-resistant Gram-negative bacteria.

Conclusions

- The report will serve as a **baseline to measure future progress**, and evidenced that there are **many gaps in information** on pathogens of major public health importance.
- AMR surveillance generally is **neither coordinated nor harmonized**, compromising the ability to assess and monitor the situation.

Surveillance of Antimicrobial Resistance: Needs and Next Steps

Vision

“To achieve a monitoring capacity that will capture the global situation of antimicrobial resistance, and inform decision-making.”

Towards **integrated surveillance** of AMR in humans and animals and in disease specific programs

Immediate steps will focus on AMR:

Standards for global surveillance

Collaborative platform for surveillance

World Health Assembly, May 2014

In May 2014, the World Health Assembly approved a resolution co-sponsored by several Member States:

“Combating antimicrobial resistance, including antibiotic resistance”



SIXTY-SEVENTH WORLD HEALTH ASSEMBLY

WHA67.25

Agenda item 16.5

24 May 2014

Antimicrobial resistance