

Strama Västerbotten

Samverkan mot antibiotikaresistens



Antimicrobial resistance -a challenge to us all

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County Medical Officer
Västerbotten County Council

Strama
the Swedish strategic programme against antibiotic resistance



Alexander Fleming discovered that the mold *penicillium notatum* killed bacteria 1928

Nobel Prize in medicine 1945



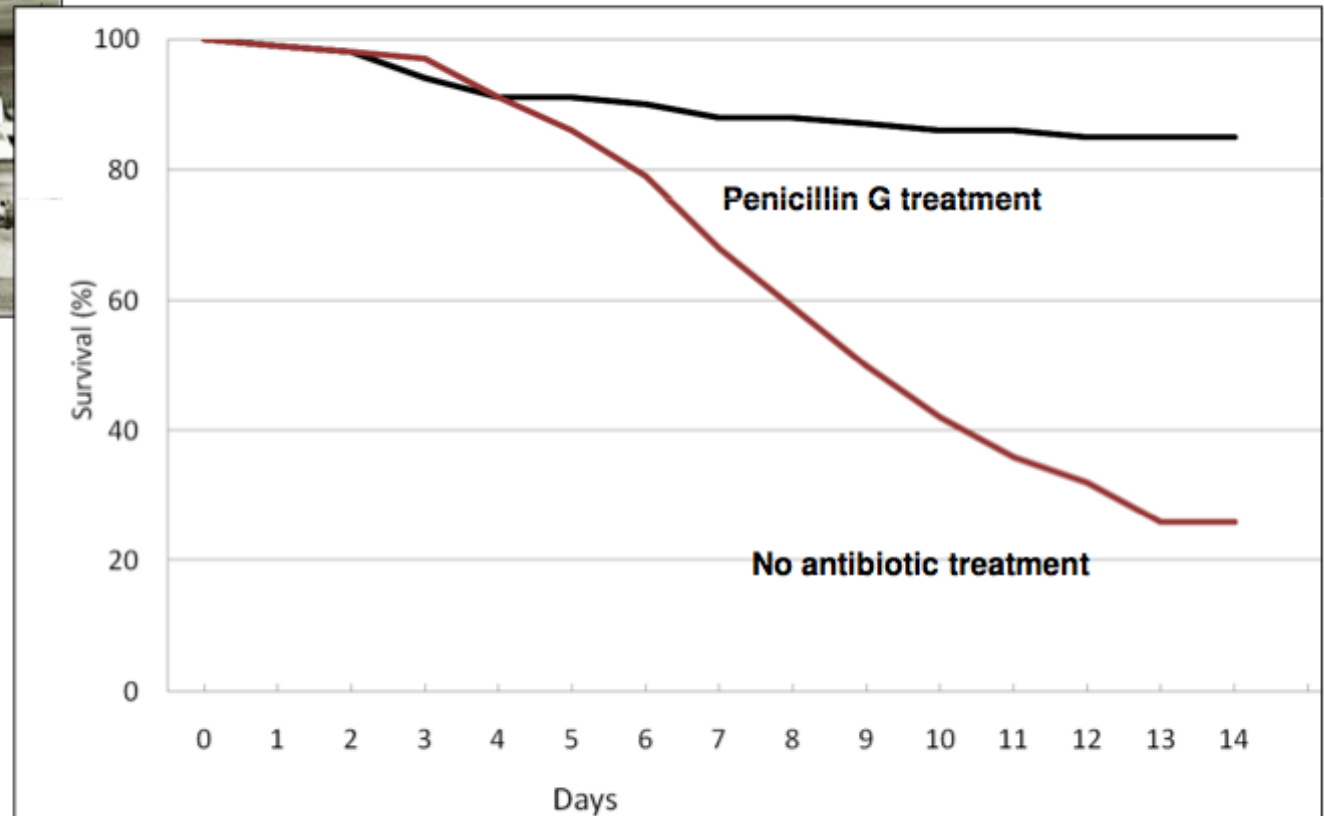
Gerhard Domagala discovered Sulfonamido-chrysoidine (KI-730) Prontosil.

Nobel Prize in medicine 1939

Antibiotics revolutionised medicine

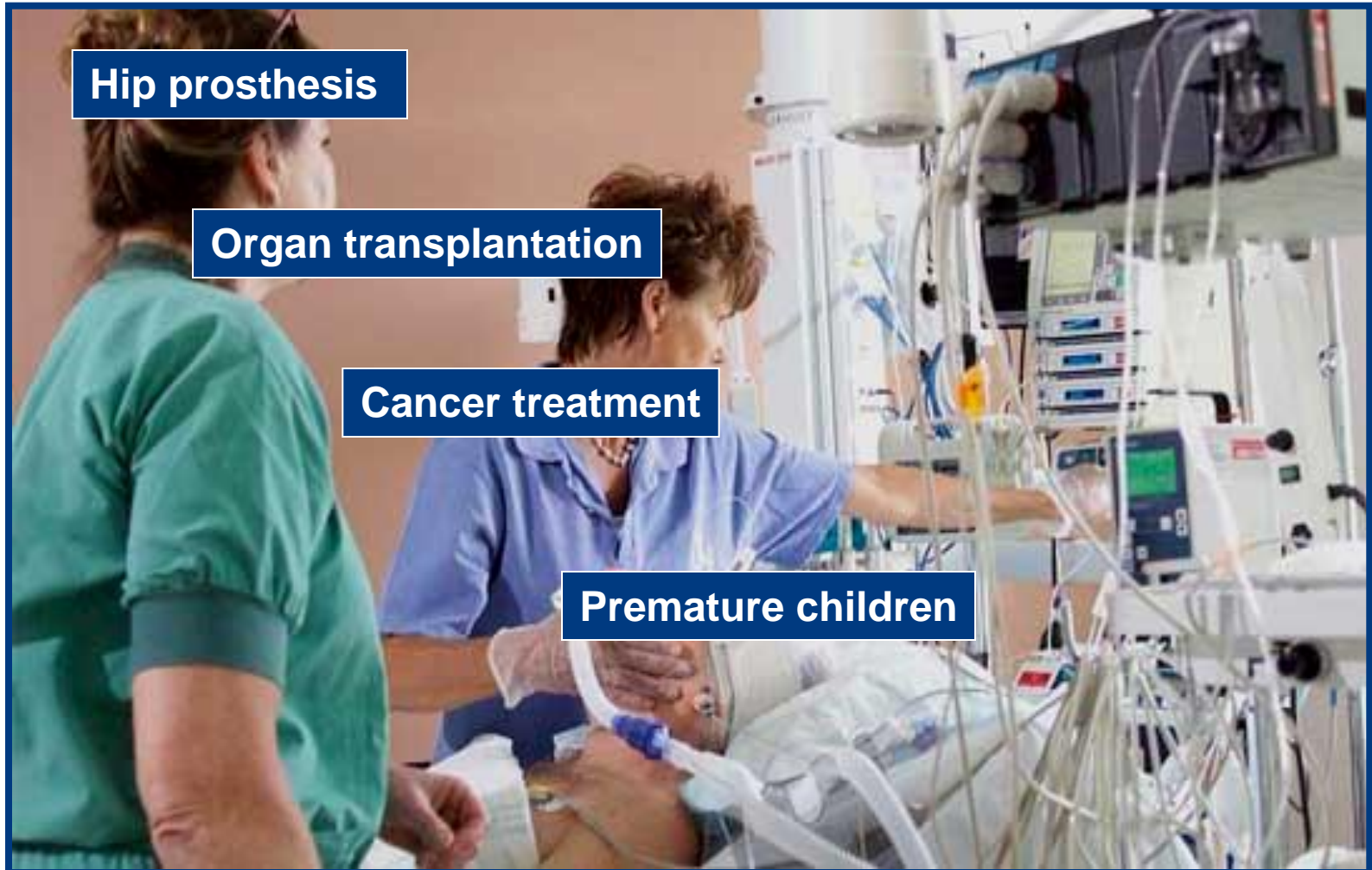
**Pneumonia with
bacteria in blood**

US, 1950's:
The introduction of penicillin **increased** the
chance of survival from ~25% to 85%



Adapted from Austrian *et al.* Ann. Int. Med 1964

Modern healthcare requires effective antibiotics



Hip prosthesis

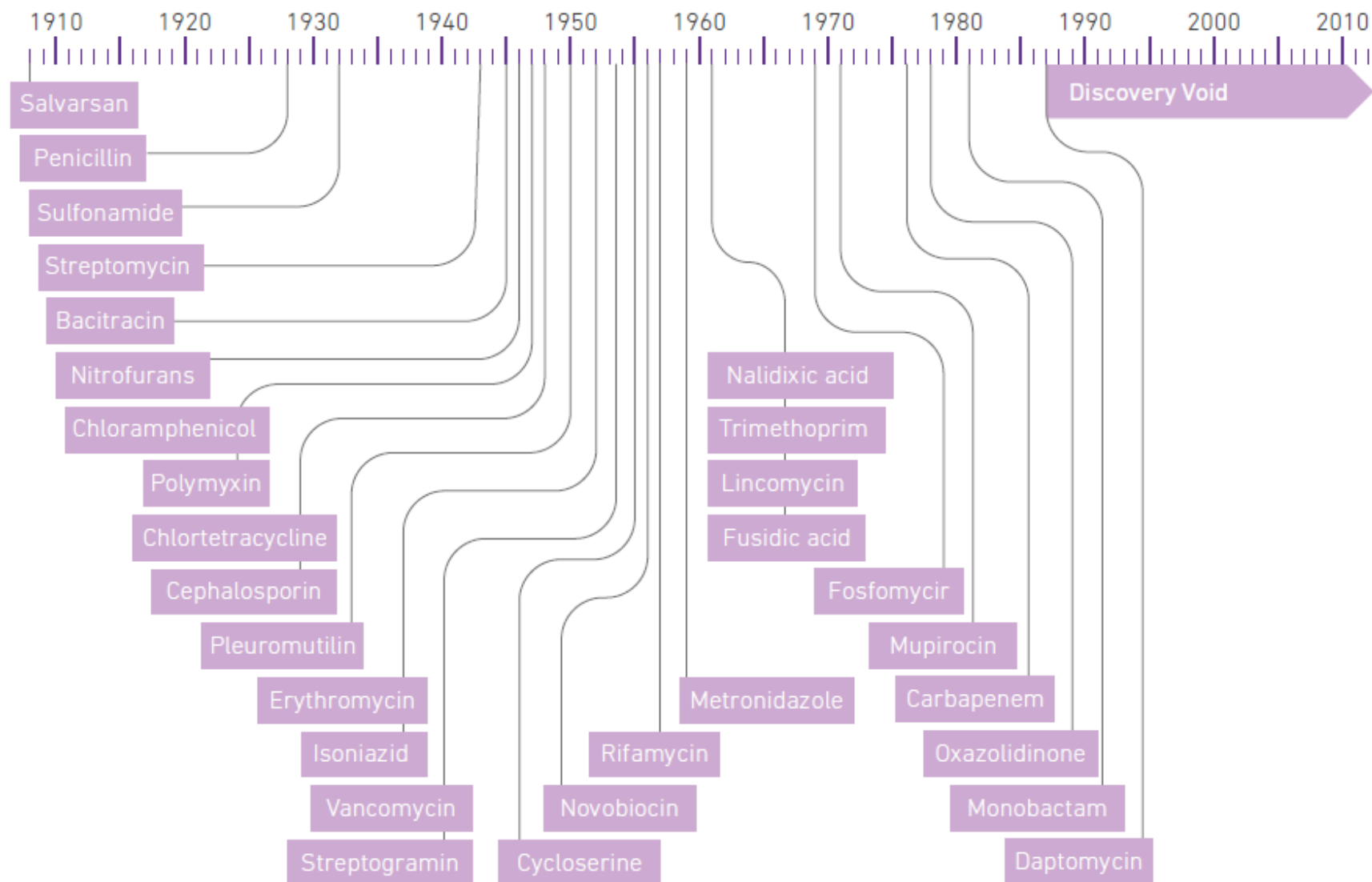
Organ transplantation

Cancer treatment

Premature children

Figure 1 Dates of discovery of distinct classes of antibacterial drugs

Illustration of the “discovery void.” Dates indicated are those of reported initial discovery or patent.



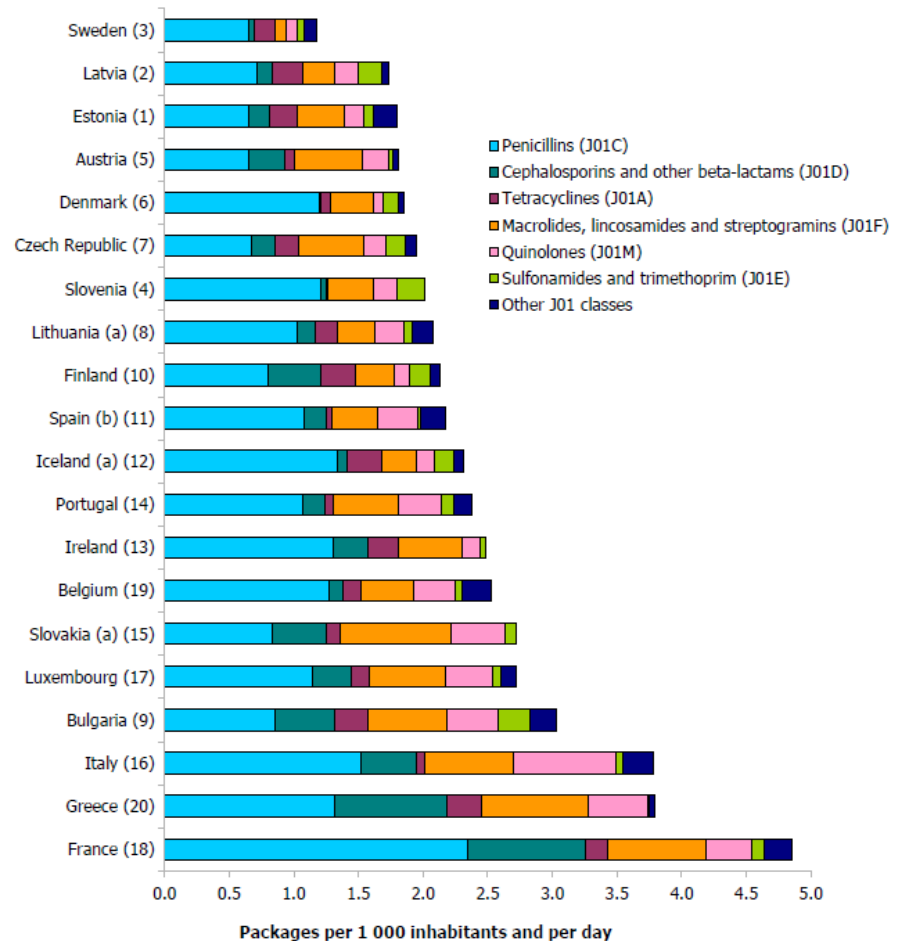
Adapted from Silver 2011 (1) with permission of the American Society of Microbiology Journals Department.

Antibiotics to humans

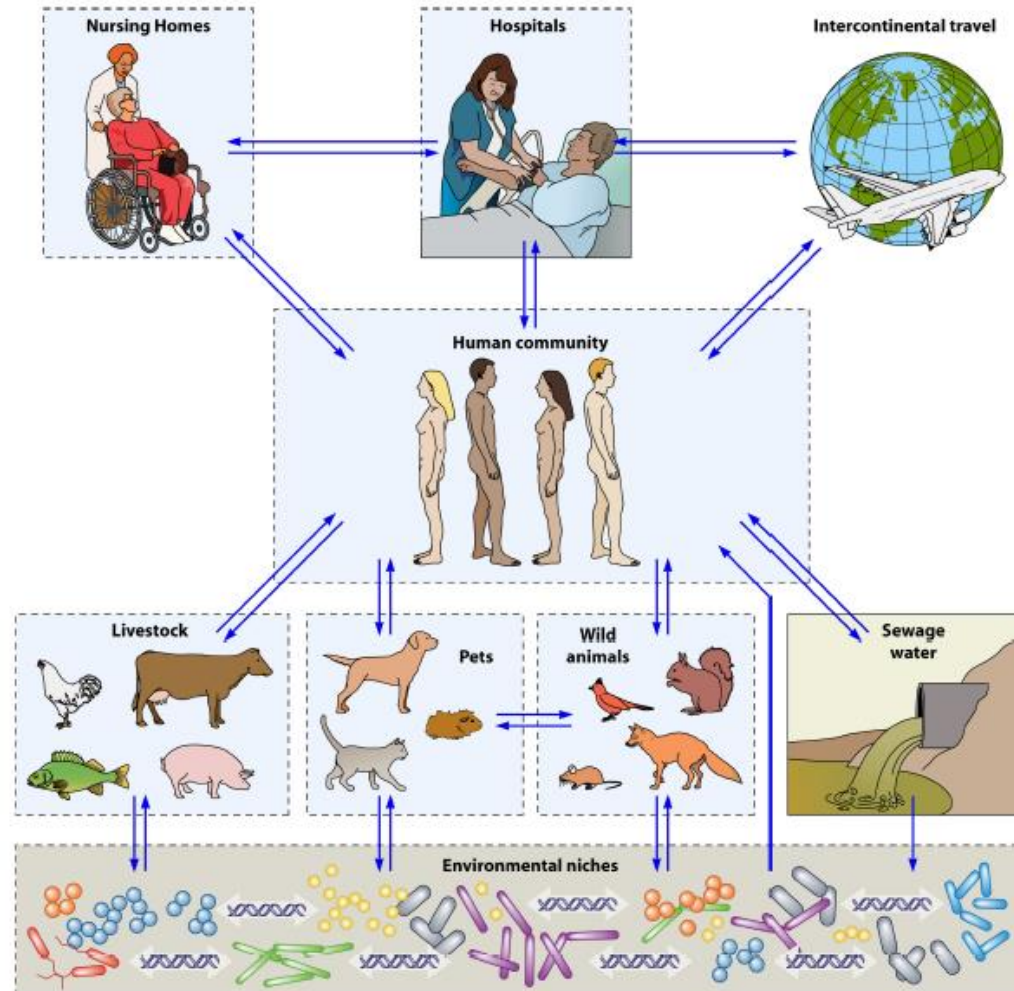
Antimicrobial resistance

Antibiotics

Figure 6.1. Consumption of packages of antibacterials for systemic use (ATC group J01, oral administration) in the community in EU/EEA countries, 2011, at group level 3, expressed as packages per 1 000 inhabitants and per day



How do bacteria spread?



How much antibiotics is used to produce one kilo of meat?

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TISDAG 18

Nyheter

Resistenta bakterier.



Mindre antibiotika i Europa

Försäljningen av antibiotika som används till djur i Europa har sjunkit med 15 procent 2010-2012.

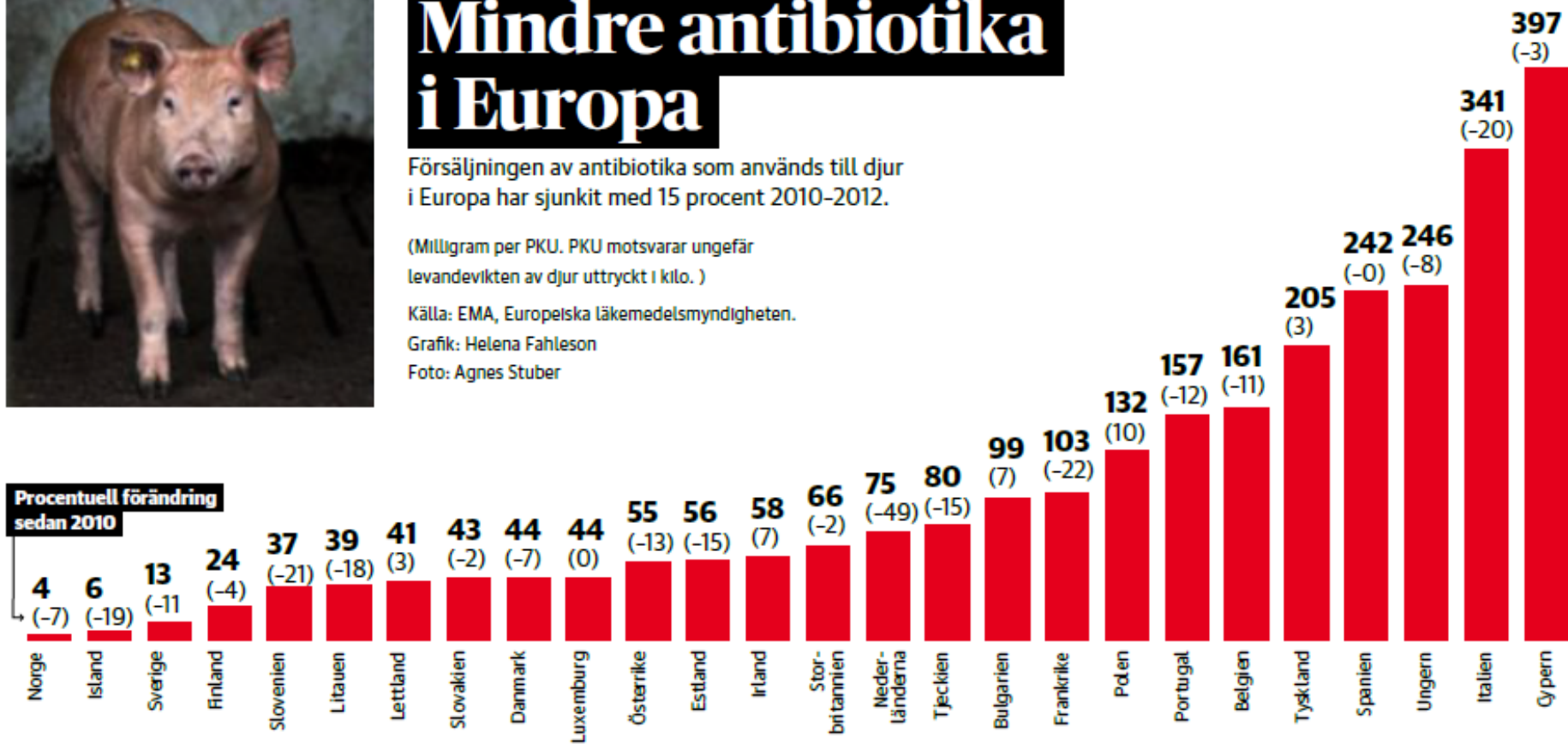
(Milligram per PKU. PKU motsvarar ungefär levandevikten av djur uttryckt i kilo.)

Källa: EMA, Europeiska läkemedelsmyndigheten.

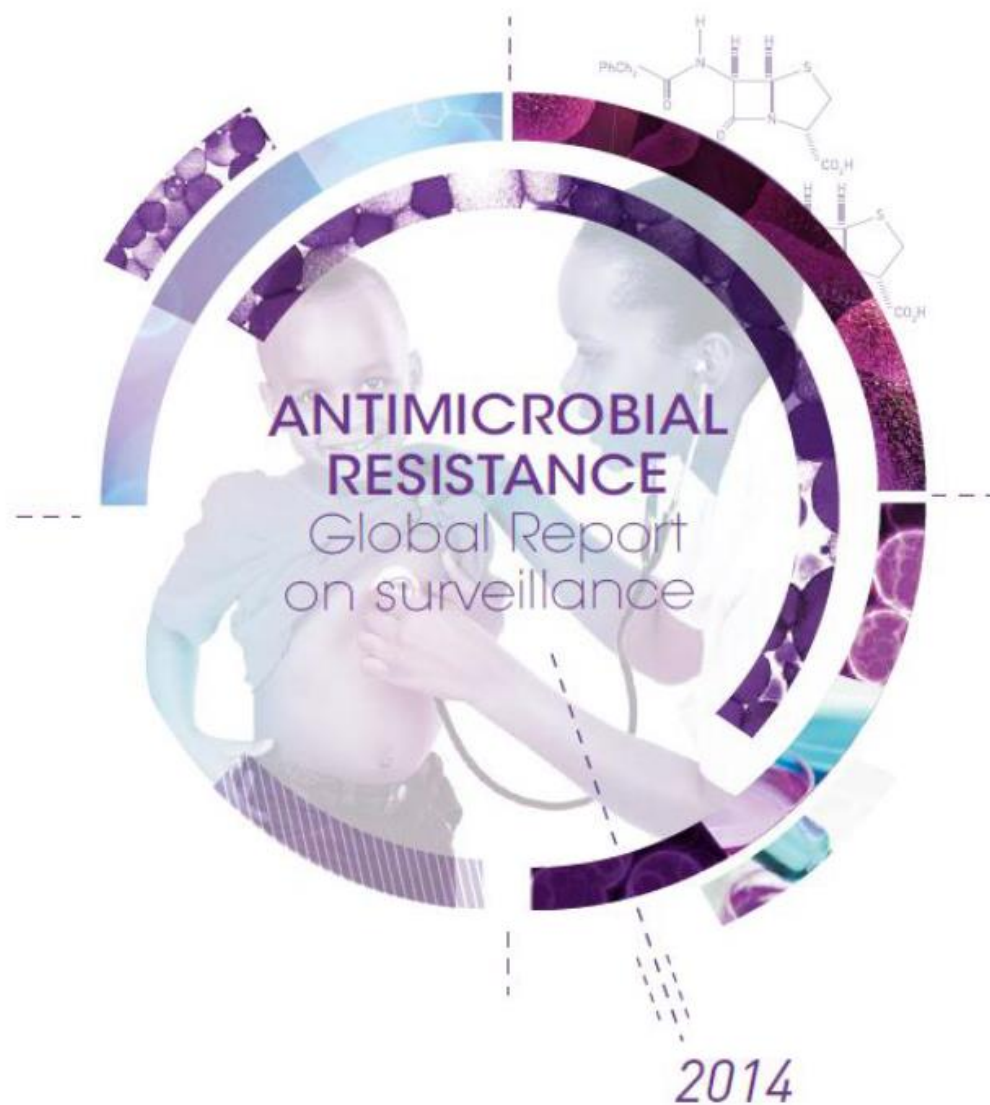
Grafik: Helena Fahleson

Foto: Agnes Stuber

Procentuell förändring sedan 2010







Selected Bacteria/Resistance Combinations

Bacterium	Resistance/ decreased susceptibility to:
<i>Escherichia coli</i> Blood stream-, urinary- and abdominal infections	3 rd generation cephalosporins, fluoroquinolones
<i>Klebsiella pneumoniae</i> Blood stream-, urinary- and abdominal infections	3 rd generation cephalosporins, carbapenems
<i>Staphylococcus aureus</i> Blood stream-, skin and post operative infections	Methicillin (beta-lactam antibiotics) i.e. MRSA
<i>Streptococcus pneumoniae</i> Pneumonia, meningitis	Penicillin
Nontyphoidal <i>Salmonella</i> (NTS) Gastroenteritis	Fluoroquinolones
<i>Shigella</i> species Gastroenteritis	Fluoroquinolones
<i>Neisseria gonorrhoeae</i> Gonorrhoea	3 rd generation cephalosporins

Available National Data* on Resistance for Nine 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

Risk of Death is Higher in Patients Infected with Resistant Strains

		Deaths (%)		
	Outcome (number of studies included)	Resistant	Not resistant	RR (95% CI)
<i>Escherichia coli</i> resistant to:				
<i>3rd gen. cephalosporins</i>	Bacterium attributable mortality (n=4)	23.6	12.6	2.02 (1.41 to 2.90)
<i>Fluoroquinolones</i>	Bacterium attributable mortality (n=1)	0	0	
<i>Klebsiella pneumoniae</i> resistant to:				
<i>3rd gen. cephalosporins</i>	Bacterium attributable mortality (n=4)	20	10.1	1.93 (1.13 to 3.31)
<i>Carbapenems</i>	Bacterium attributable mortality (n=1)	27	13.6	1.98 (0.61 to 6.43)
<i>Staphylococcus aureus</i> resistant to:				
<i>Methicillin (MRSA)</i>	Bacterium attributable mortality (n=46)	26.3	16.9	1.64 (1.43 to 1.87)

Estimates of Burden of Antibacterial Resistance

European Union *population 500m*

25,000 deaths per year

2.5m extra hospital days

Overall societal costs
(€ 900 million, hosp. days)
Approx. €1.5 billion per year



Source: ECDC 2007

Thailand *population 70m*

>38,000 deaths

>3.2m hospital days

Overall societal costs
US\$ 84.6–202.8 mill. direct
>US\$1.3 billion indirect



Source: Pumart et al 2012

United States *population 300m*

>23,000 deaths

>2.0m illnesses

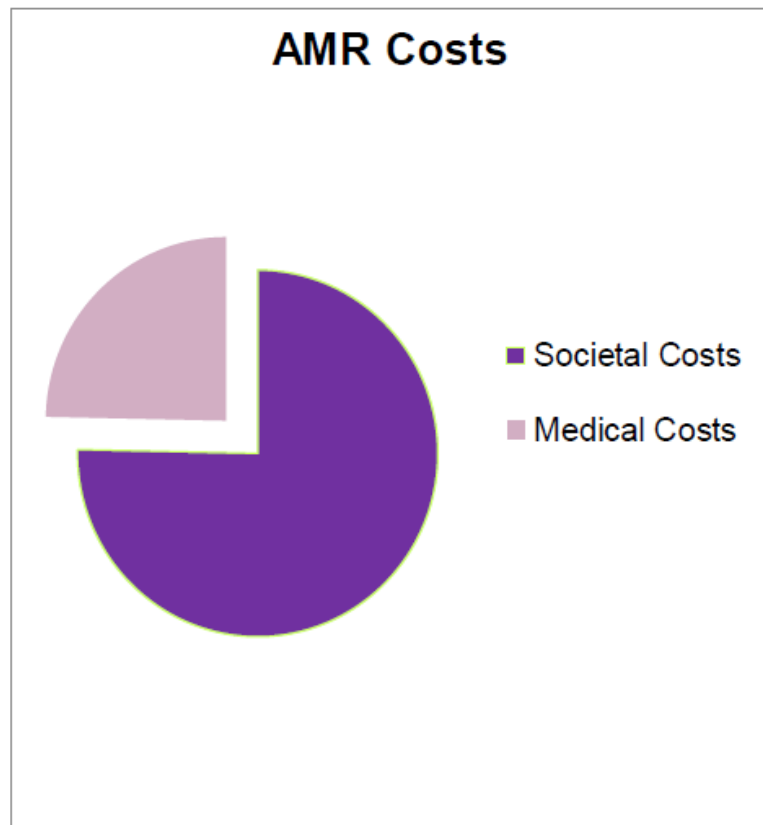
Overall societal costs
Up to \$20 billion direct
Up to \$35 billion indirect



Source: US CDC 2013

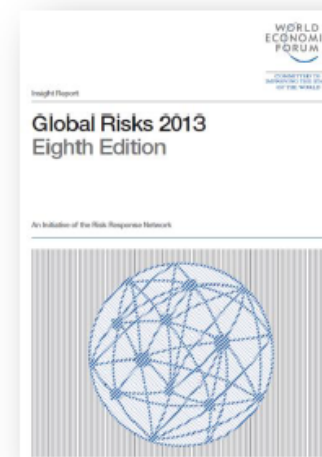
Global information is insufficient to show complete disease burden impact and costs

Overall Economic Impact Much Higher



- Reduced consumer income, employment, savings
- Increased national investment, spending, healthcare delivery
- Reduced gross domestic product (GDP): 1.4% to 1.6%

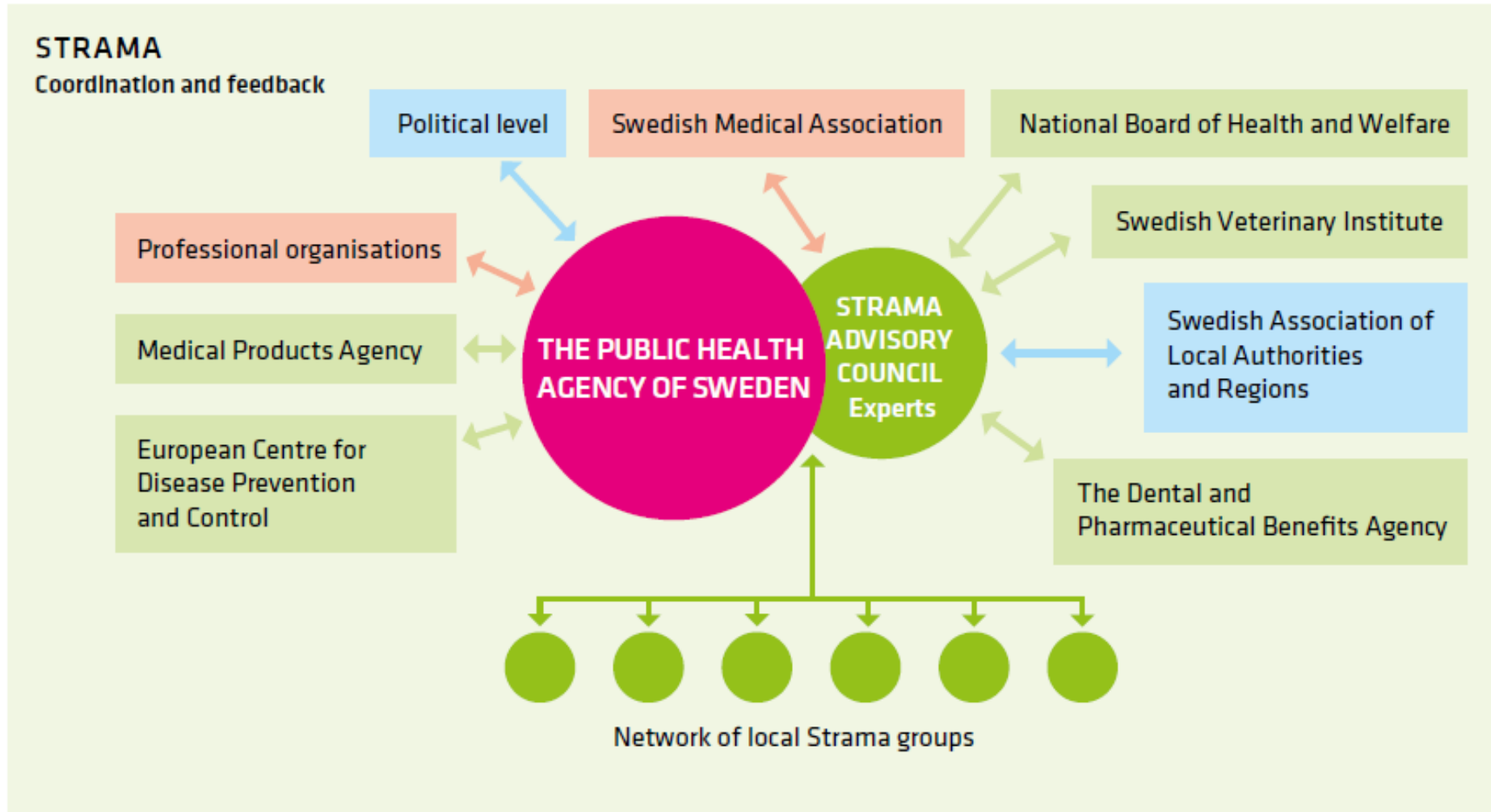
Source: Roberts et al CID 2009; 49:1147-84.



What needs to be done?

- The same goal and commitment all the way
 - Politics – government - health care system - doctor - patient
- Surveillance of antimicrobial resistance
- A system to monitor the prescription of antibiotics with feed-back to the prescriber
- Education of doctors and nurses
 - Increase the quality of prescription
 - Decrease the overuse
- Collaboration on and between all levels

Figure 2.3: Strama's relationship with several other actors.



Strama
The Swedish strategic programme against antibiotic resistance

Surveillance of Antimicrobial Resistance for Local and Global Action

Stockholm, Sweden, 2-3 December 2014

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International collaboration to build global AMR surveillance

On 2-3 December 2014, the Swedish Ministry of Health and Social Affairs and the Public Health Agency of Sweden will host a High Level Technical Meeting, co-sponsored by WHO.

The purpose of the meeting is to raise awareness and commitment to the development and early implementation of a global program for surveillance of Antimicrobial Resistance (AMR) in human health. The meeting will focus on strategies to improve and implement local and global surveillance of antimicrobial resistance, with a particular emphasis on resistance to antibiotics.



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Antimicrobial resistance 2011

	MRSA	E-coli ESBL	Klebsiella ESBL	E-coli Kinolonresistant	MRSA (Staphylococci)
Finland	2,8	5,1	3,4	10,8	0
Norway	0,3	3,6	2,9	9,0	0
Russian federation	66/3,8 *	22,9/13 *	90/38 *	71,1/15,9 *	3-18/0-4,4 *
Sweden	0,8	3,0	2,3	7,9	0

★ Hospital samples/community UTI

* Hospital samples/community samples