

Trends in antibiotic use in Swedish Intensive Care Units 1999-2009



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ICU-Strama and Swedish ICU registry

Background



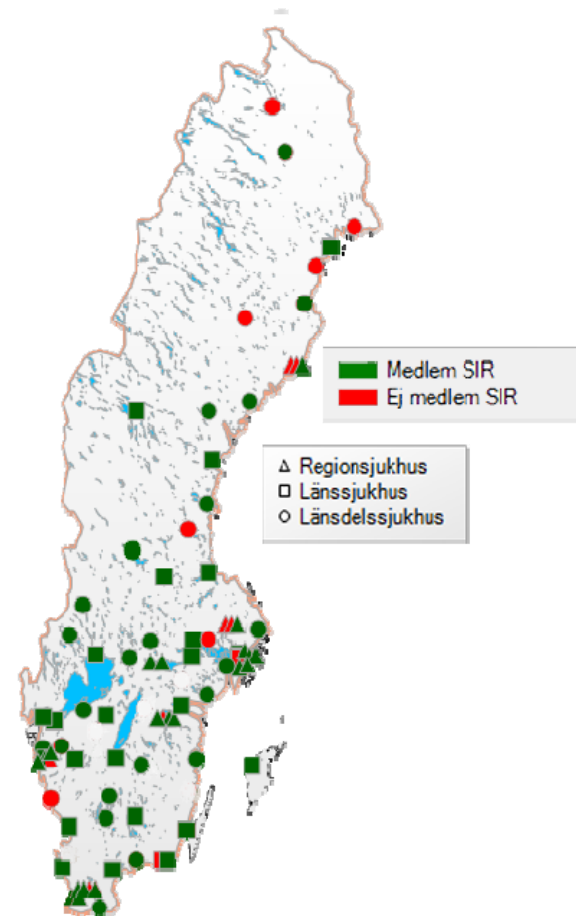
- Swedish ICU-Strama started 1999
- ICU-Strama collects aggregated ICU data on
 - antibiotic use
 - antibiotic resistance
 - infection control procedures.



- From 2005 joint project between ICU-Strama and the Swedish Intensive Care Registry (SIR)
- SIR collects data from individual patients.

Members of Swedish Intensive Care Registry (SIR) 2008

- 70 members
- 18 non members
- 52 ICUs reported number of bed days 2008

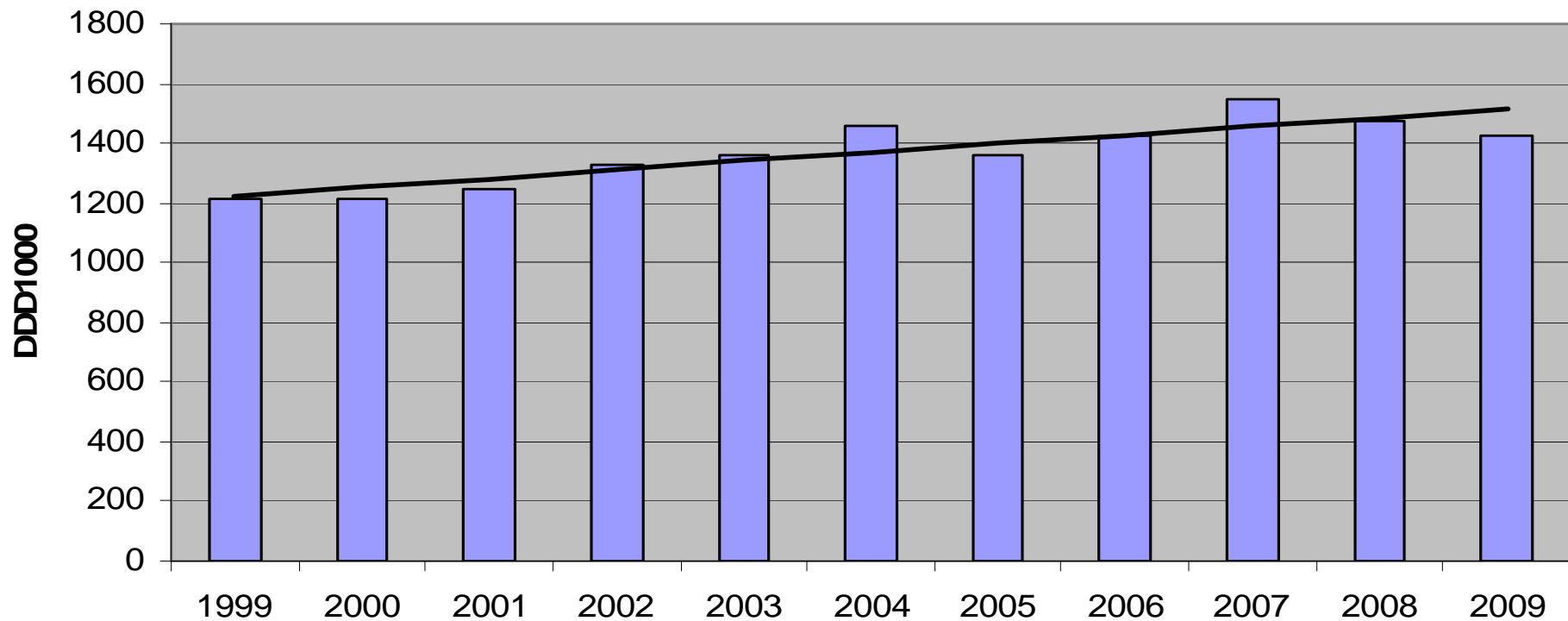


Materials and methods

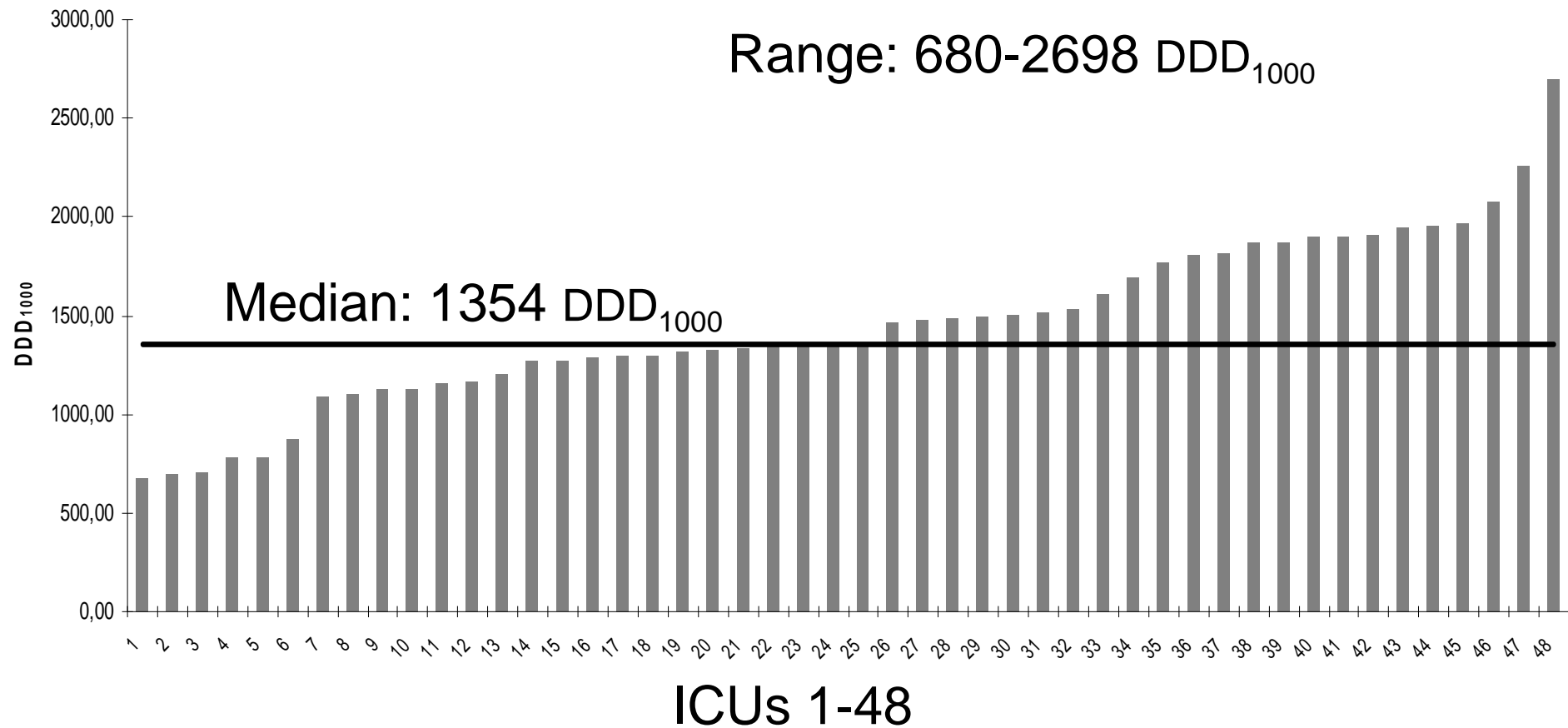
- Hospital pharmacies provided data on delivered amounts of antibiotics to the ICUs.
- ATC-classification of antibiotics were used.
- Annually updated DDDs calculated by WHO Collaborating Centre for Drug Statics and Methodology were used.
- Number of bed days were based on all admissions to the ICUs.
- Data were analysed using linear regression and Spearman's rank correlation.

Mean Total Antibiotic Consumption in Swedish ICUs 1999-2009

- **1999:** 1216 defined daily doses per 1,000 occupied bed days (DDD_{1000})
- **2009:** 1425 DDD_{1000}
- $P < 0,001$
- Trend = 31 DDD_{1000} /year

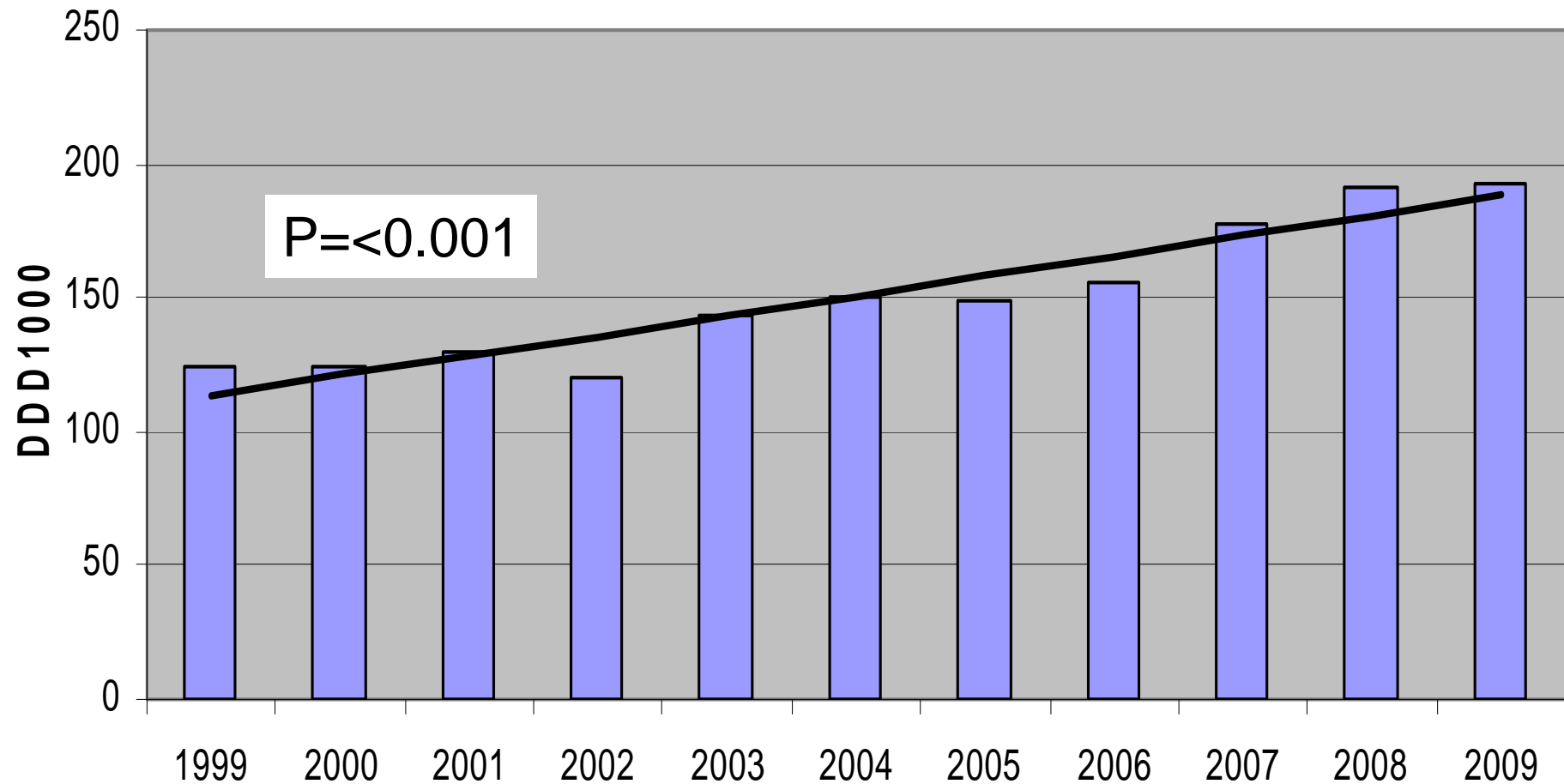


Total antibiotic consumption 2009 - Swedish ICU:s



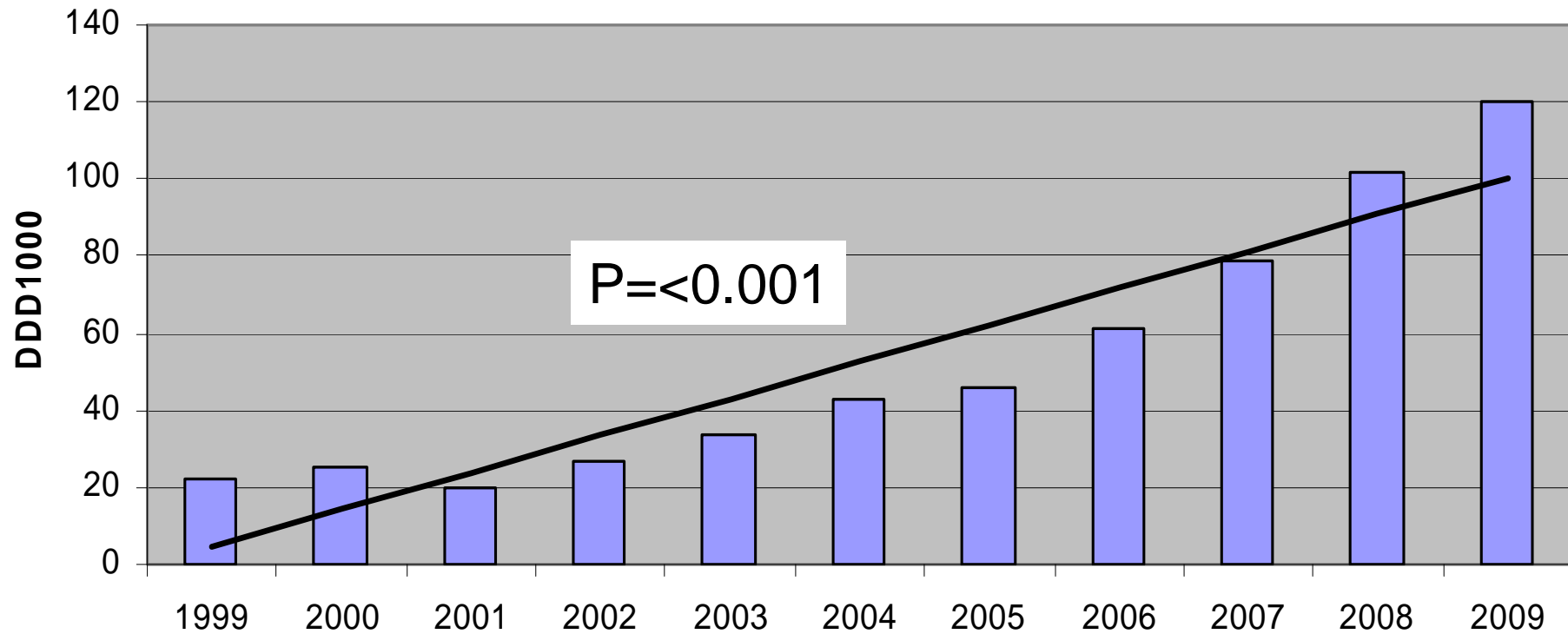
Carbapenems

Trend=7.5 DDD₁₀₀₀/year



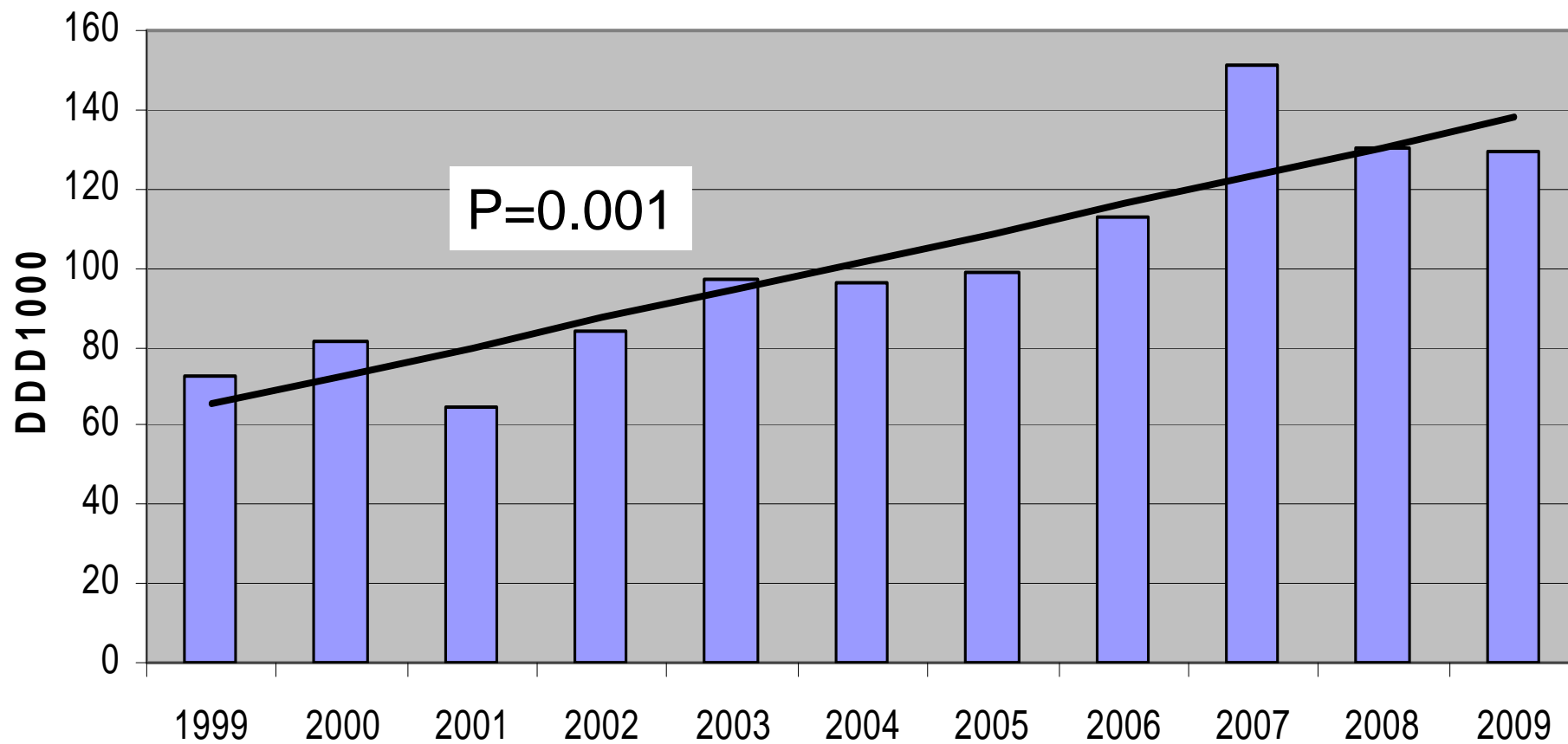
Piperacillin-Tazobactam

Trend=10 DDD₁₀₀₀/year



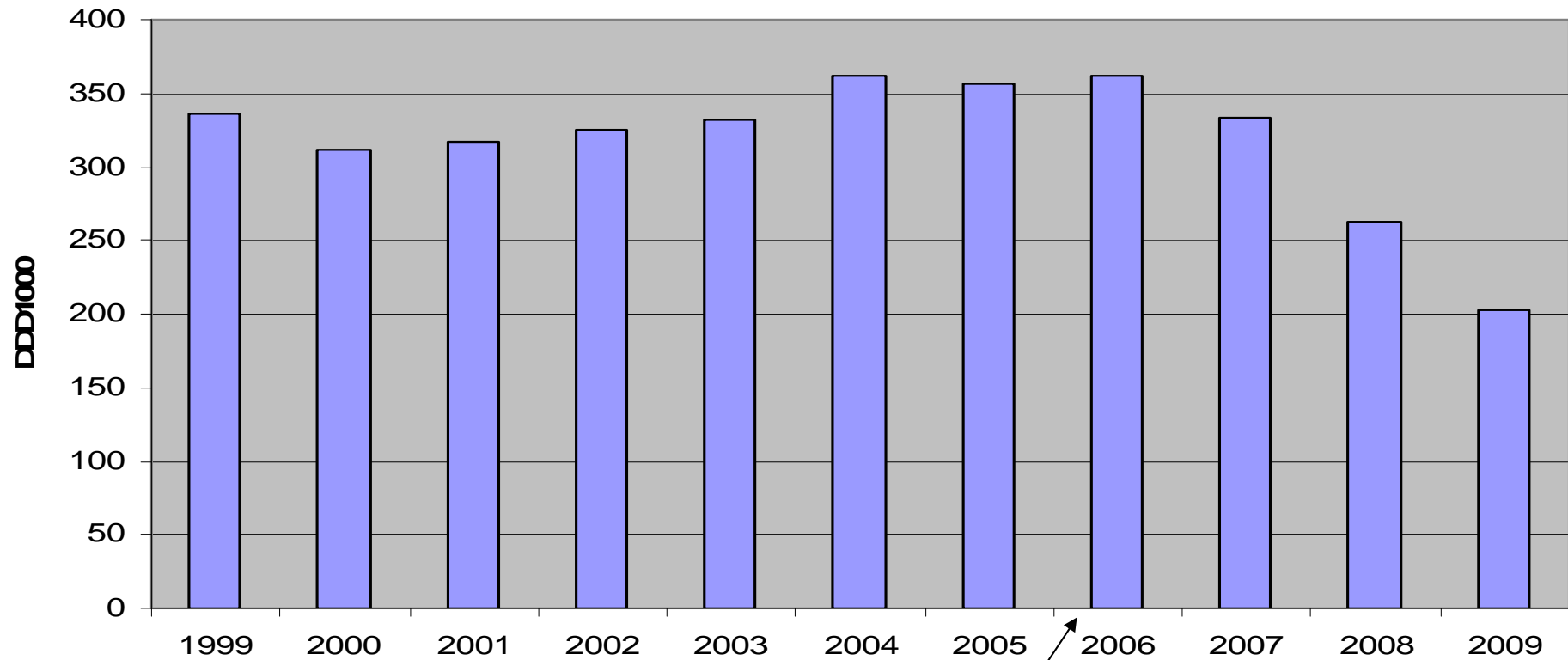
Triazole

Trend=7 DDD₁₀₀₀/year



Cephalosporins

P=0.2 (NS)



STRAMA launches campaign to reduce cephalosporin consumption

Increase in antibiotic consumption

Antibiotic	DDD ₁₀₀₀ - Average weighted by number of bed days											Trend	
	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	(DDD ₁₀₀₀ /Year)	p
Aminoglycosides	29	26	25	25	32	38	36	36	41	43	43	1,91	<0.001
Beta-lactamase sensitive penicillins	49	51	62	57	63	60	56	59	63	73	79	2,17	0,002
Carbapenems	125	125	130	120	143	150	149	156	178	191	192	7,47	<0.001
Cephalosporins (all)	336	311	317	325	332	362	356	362	333	262	203	-6,52	0,16
Combinations of penicillins, incl. beta-lactamase inhibitors	22	25	20	27	34	43	46	61	79	102	120	9,58	<0.001
Fluoroquinolones	92	100	104	121	114	118	107	105	101	99	83	-0,88	0,43
Glycopeptides	27	25	28	25	22	34	31	33	36	40	48	1,94	<0.001
Imidazoles (J01XD)	61	60	64	70	67	70	61	65	62	52	41	-1,38	0,08
Isoxazolyl-pc	204	224	230	272	248	260	223	197	230	245	211	-0,5	0,84
Lincosamides	41	39	41	48	48	46	41	44	47	48	44	0,47	0,15
Macrolides	58	52	43	41	32	36	40	42	48	45	42	-0,77	0,28
Triazole derivatives	73	81	65	84	97	96	99	113	151	130	129	7,22	<0.001
other	99	95	120	115	127	146	117	151	175	144	192		
Total	1216	1214	1249	1330	1359	1459	1362	1424	1544	1474	1425	30,69	<0.001

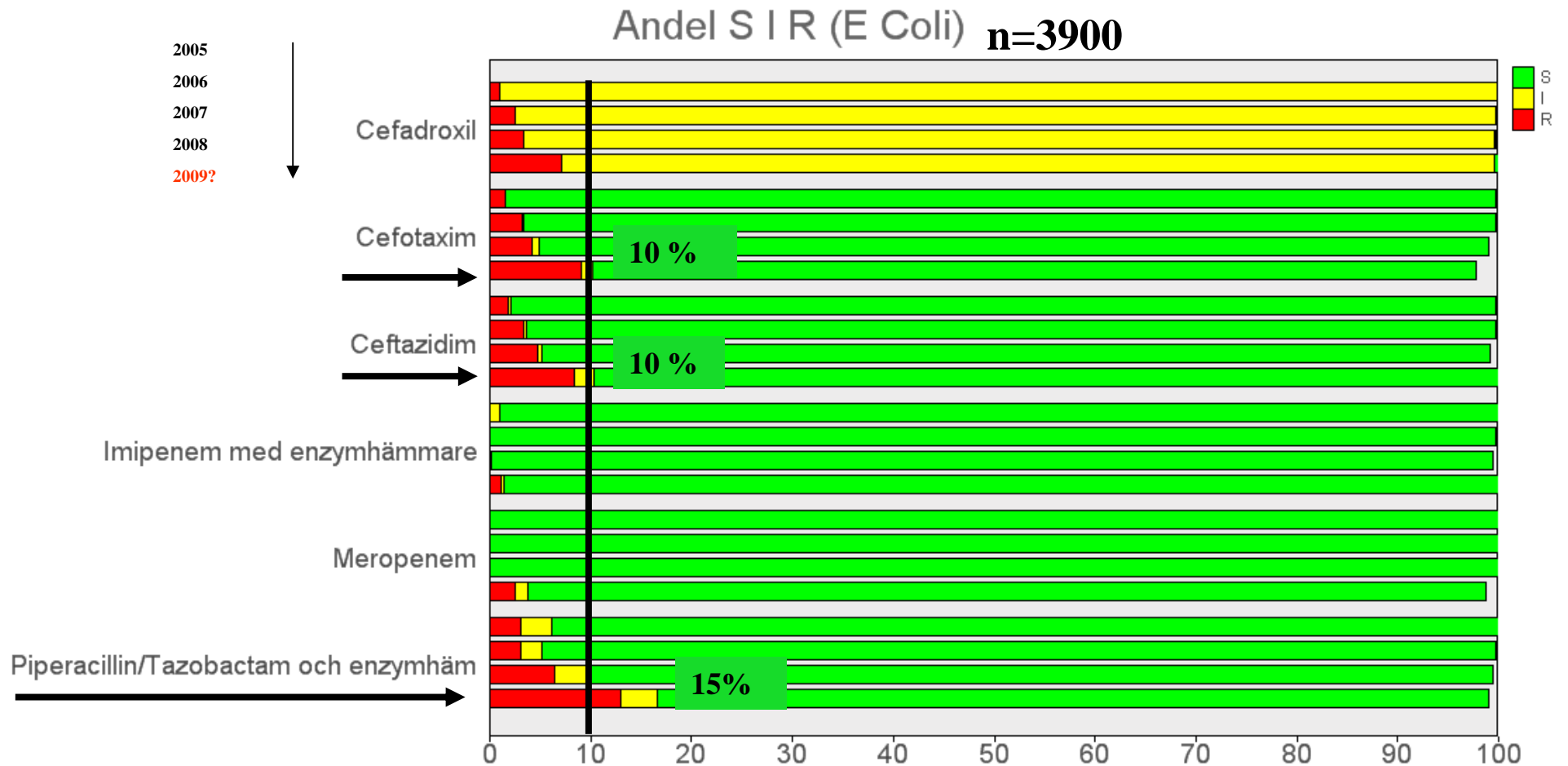
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Major Findings

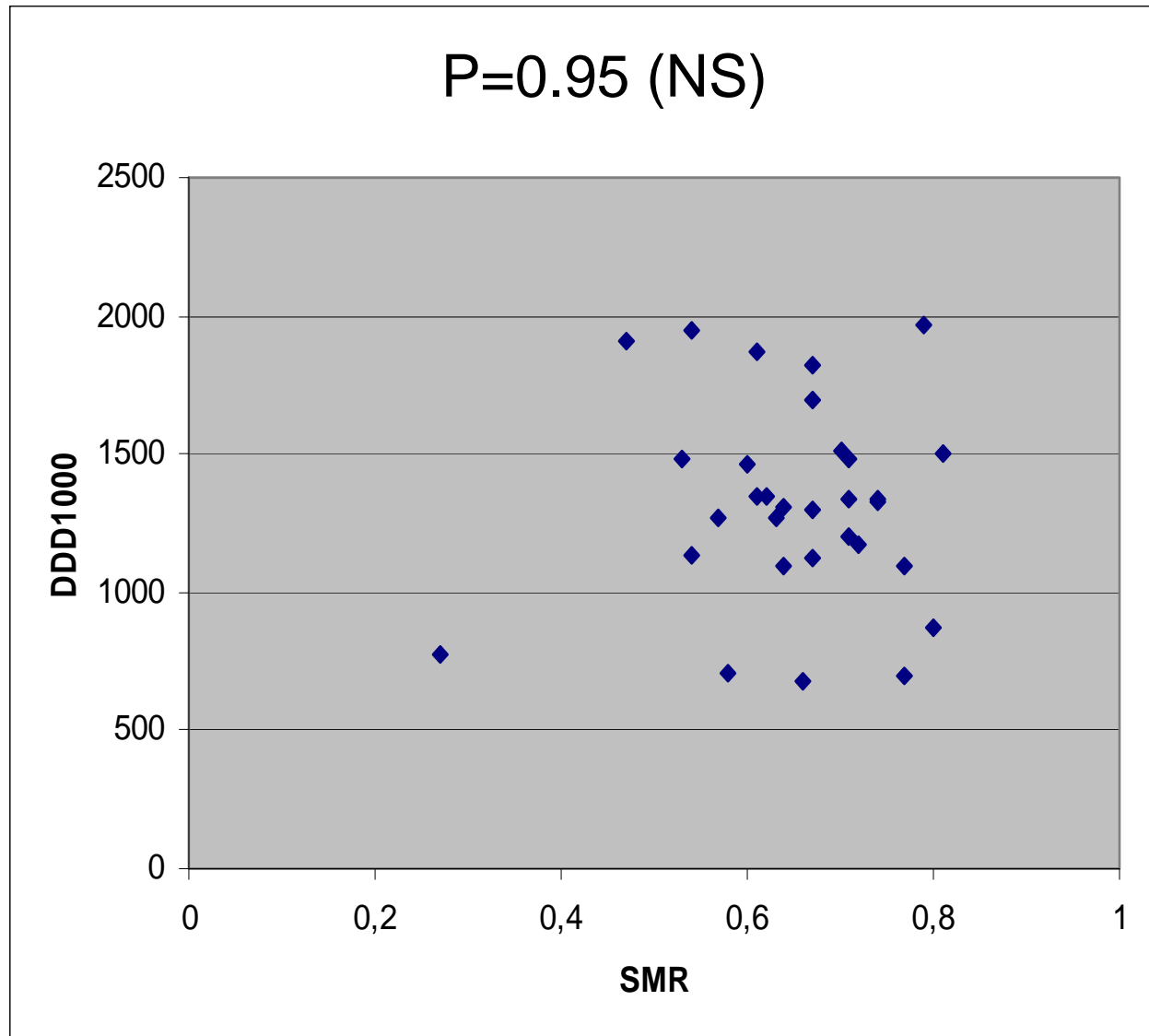
- Reduced cephalosporin consumption (last 3 years)
- Increased carbapenem consumption
- Increased piperacillin-tazobactam consumption

What about resistance to these drugs?

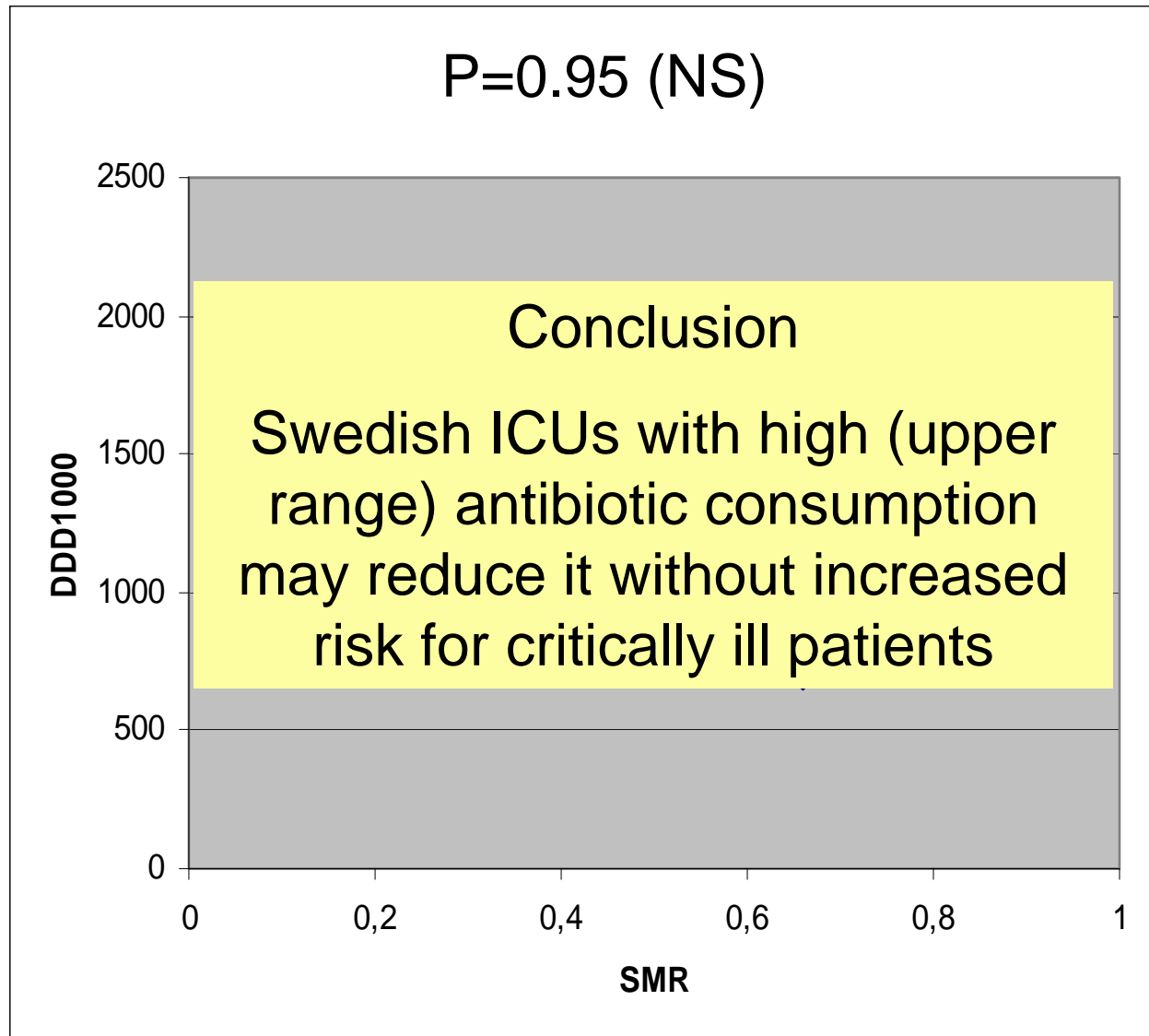
Trends towards increased cephalosporin and pip-tazo resistance among *E. coli* isolated from Swedish ICU patients 2005 - 2008



Correlation between AB consumption and standardised mortality rate (SMR) based on SAPS3 - 31 ICU:s 2009



Correlation between AB consumption and standardised mortality rate (SMR) based on SAPS3 - 31 ICU:s 2009



Antibiotic Use based on drugs delivered by each hospital pharmacy

Potential errors

- drugs may be delivered but not administered to patients
- dosing in ICU – not always standard WHO doses
 - increased dosing due to life-threatening disease (sepsis/meningitis etc)
 - decreased dosing in renal failure
 - lower doses in children
- differences in reporting bed days

Why continue to collect data based on drugs delivered by each hospital pharmacy?

- Easy access
- Low cost
- Not time consuming
- Sustainable
- Useful for bench marking
- May be used for measuring effect of interventions = Time series analysis

Measurable goals for antibiotic use in ICUs



1. Appropriate antibiotics without delay
2. Culture before start of antibiotics
3. Narrow spectrum based on culture results
4. Compliance to local and national treatment guidelines
5. Shorter courses
6. Reduce broad spectrum