



# **NordicAST multi-centre study on automated AST**

## Preliminary results

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- on behalf of the project group

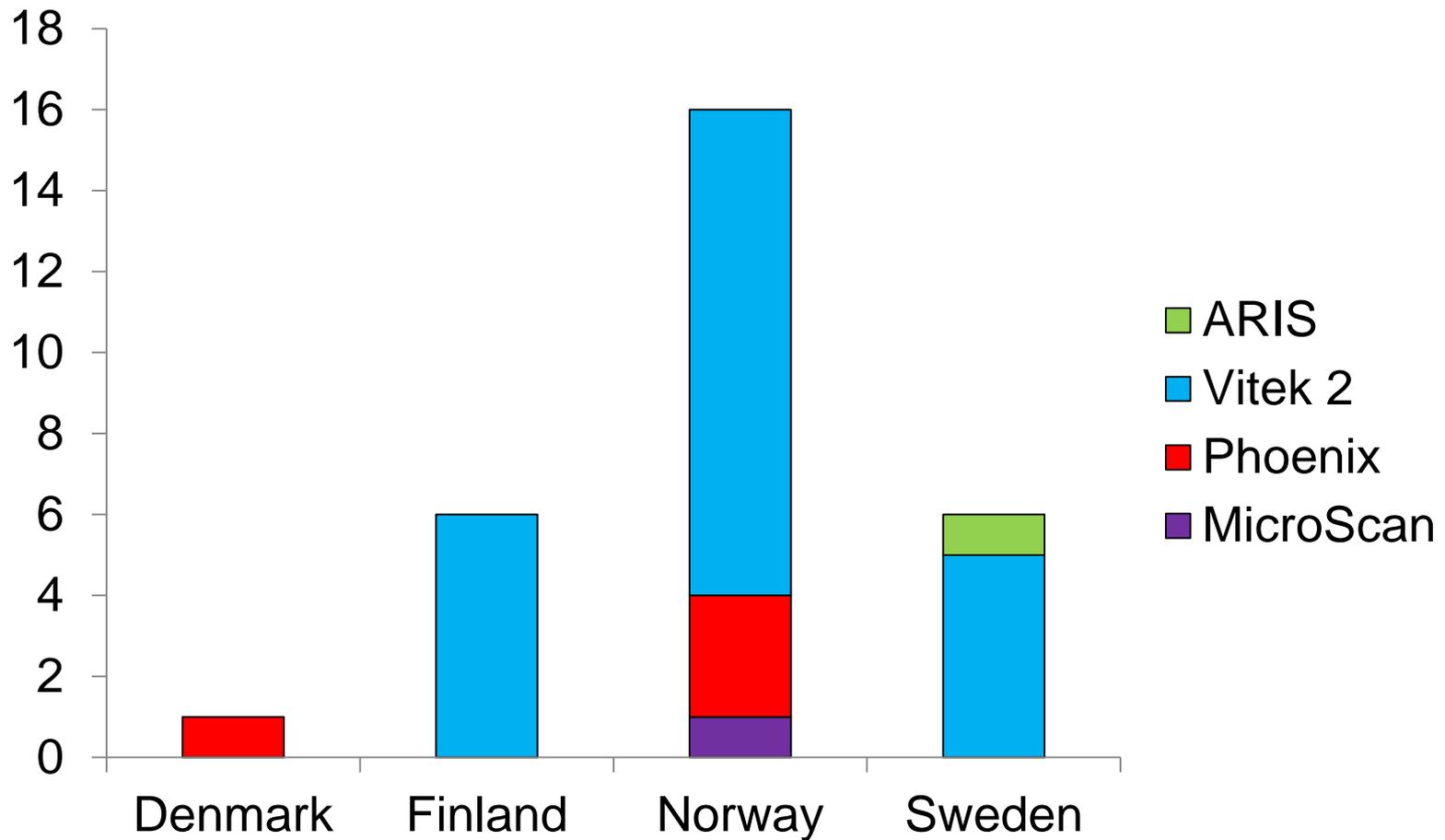
NordicAST WS 2017

# Aim

- To evaluate AST in automated systems using a well-characterised collection of Gram-negative (*Escherichia coli*, *Klebsiella pneumoniae*, *Pseudomonas aeruginosa*) bacteria.
- To evaluate for each antimicrobial-agent combination:
  - Essential agreement (MICs within  $\pm 1$  dilution of reference MIC)
  - Categorical agreement (correct SIR categorization)

# 28 laboratories participated

(Karolinska Solna with two systems)



# Automated systems included

- Vitek2, bioMérieux (23)
- Phoenix, BD (4)
- MicroScan, Beckman Coulter (1)
- ARIS, Thermo Fisher Scientific (1)

# Antimicrobial agents included

- **Mandatory**

- Piperacillin-tazobactam
- Cefotaxime
- Ceftazidime
- Imipenem
- Meropenem
- Gentamicin
- Ciprofloxacin
- Trimethoprim-sulfamethoxazole

- **Optional**

- Ampicillin
- Ertapenem
- Amikacin
- Colistin

# Isolates included

- 20 Gram-negative bacteria
- *E. coli*
  - N=7 (including ATCC 25922)
- *K. pneumoniae*
  - N=6 (including ATCC 700603)
- *P. aeruginosa*
  - N=7 (including ATCC 27853)

# Reference testing

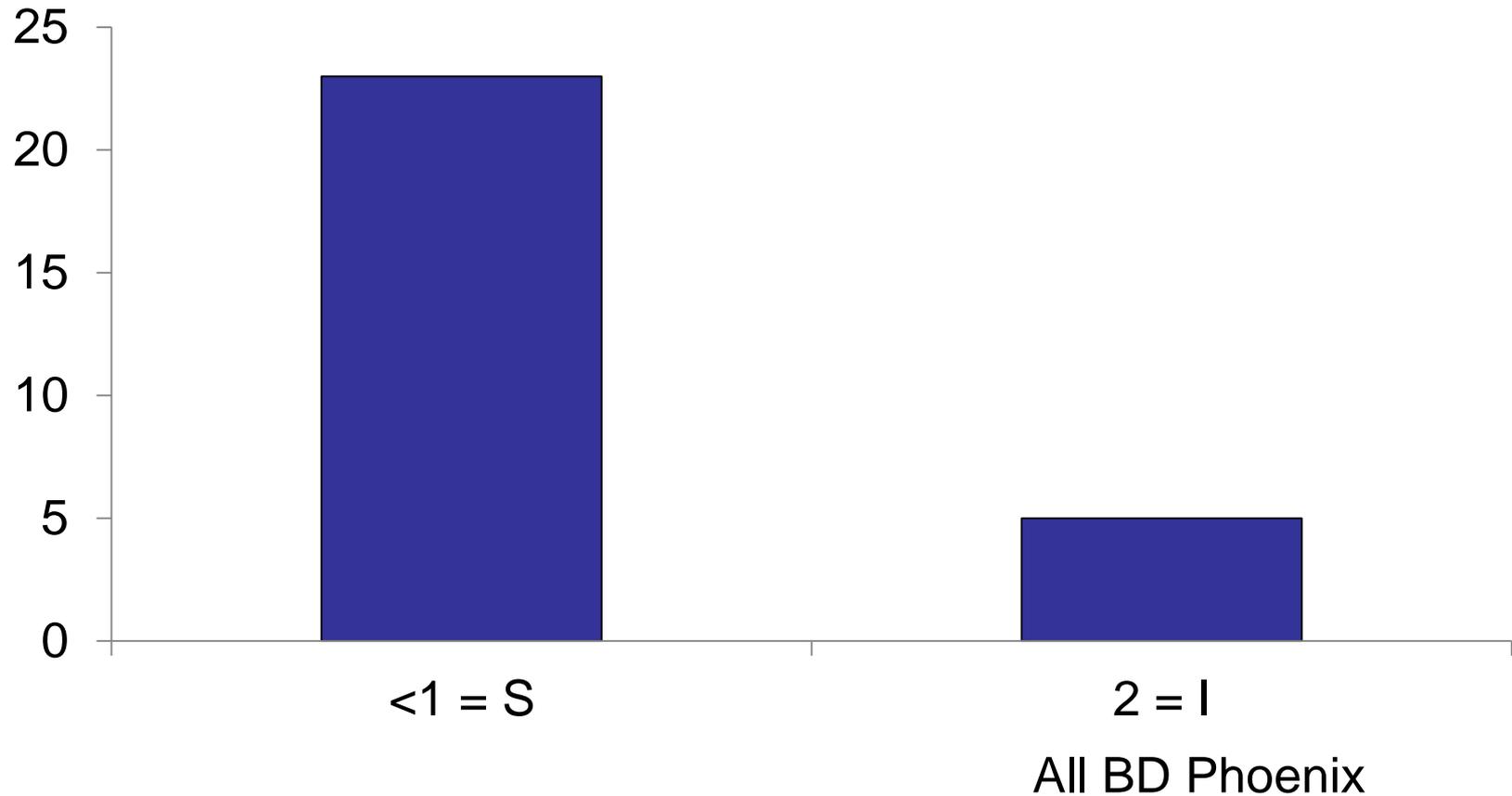
- Broth microdilution (BMD) was performed according to ISO standard 20776-1 on Sensititre plates
  - 3 separate tests per isolate
  - A consensus MIC was calculated for all agents included in the study
    - Examples:
      - 2,2,2 = 2 mg/L
      - 2,2,1 = 2 mg/L
      - 2,1,1 = 1 mg/L

# First impressions

- Difficult to put together a representative collection for all agents
- Differences between systems
- Systematic deviations for some agents
- Difficulties when results are around BP:s
- Essential agreement (MICs within  $\pm 1$  dilution of reference MIC) often difficult to estimate because of different measuring methods and different scales

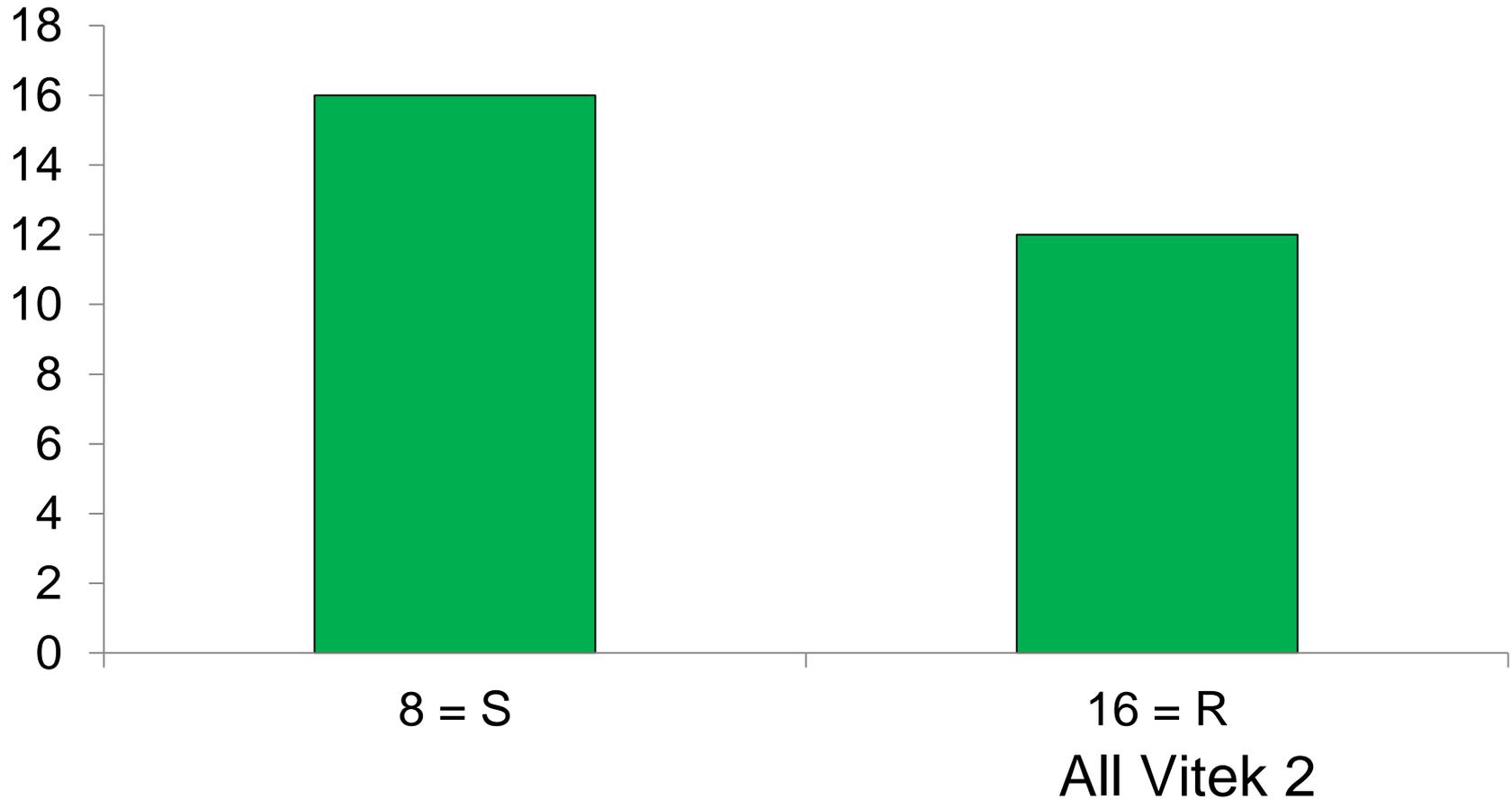
# Isolate no. 13 *K. pneumoniae*

Ceftazidime reference MIC 1 mg/L = Susceptible



# Isolate no. 20 *P. aeruginosa*

Ceftazidime reference MIC 8 mg/L = Susceptible



# Presentation of results

	Reference MIC (mg/L)						
	2	4	8	16	32	64	≥128
≤4	81	103		6			
≤8	3	9		31			
16				14			
≥32				4			112

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Categorical discrepancy, but within  $\pm 1$  dilution from reference

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Categorical discrepancy, but within  $\pm 1$  dilution from reference

Categorical discrepancy and  $> 1$  dilution from reference

# Piperacillin-tazobactam

## *E. coli* and *K. pneumoniae*

	Reference MIC (mg/L)						
	2	4	8	16	32	64	≥128
≤4	81	103		6			
≤8	3	9		31			
16				14			
≥32				4			112

4 x Vitek2  
2 x Phoenix

All systems!

# Piperacillin-tazobactam

## *P. aeruginosa*

	Reference MIC (mg/L)					
	4	8	16	32	64	≥128
≤8	28	56		1		
16				8		
32				43		
≥64				1	27	27

MicroScan

6 x Phoenix  
MicroScan  
ARIS

# Cefotaxime

## *E. coli* and *K. pneumoniae*

Reference MIC (mg/L)

	0.06	0.125	0.25	0.5	1	2	4	8	≥16
≤0.5	9		3	1	1				
≤1	57		19	21	20	6	16		
2					1	10	8		
4						3	4		
8						2	7		
16							3		
≥32							3		76

2 x Vitek2

All Vitek2!

# Meropenem

## *E. coli* and *K. pneumoniae*

Reference MIC (mg/L)

	≤0.015	0.03	0.06	0.125	0.25	0.5	1	2	4	8	16	≥32
≤0.25	84	140						1				
0.5						1						
1						11	11		1		1	
≤2						13	6		3			
4					2		8		1		3	
8							2		1		3	
≥16									23		22	28

Arrows from the table indicate the following counts:
 

- 4 x Vitek2 (from MIC 1 and 2)
- Vitek2 (from MIC 4)
- 3 x Phoenix (from MIC 16)

# Meropenem

## *P. aeruginosa*

Reference MIC (mg/L)

	0.25	0.5	1	2	4	8	16
$\leq 0.5$	28	0	28				1
$\leq 2$	1		1				
4					31		
8					21		
$\geq 16$					5		86

5 x Vitek2

# Ciprofloxacin

## *E. coli* and *K. pneumoniae*

	Reference MIC (mg/L)								
	≤0.015	0.03	0.06	0.125	0.25	0.5	1	4	>4
≤0.25	84	28	83		27	28			
0.5					1	14			
1						13	27	7	
≥2							2	22	29

All systems

# Ciprofloxacin

## *P. aeruginosa*

Reference MIC (mg/L)

	$\leq 0.125$	0.25	0.5	1	2	4	8	$\geq 16$
$\leq 0.5$	29	28	21		2			
1			37		18			
$\geq 2$					9	28		29

2 x Vitek2



# Colistin

## *E. coli* and *K. pneumoniae*

Reference MIC (mg/L)

	$\leq 0.25$	0.5	1	2	4
$\leq 1$	36	35			
$\leq 2$	5	5			
4	1	2			4
$\geq 8$					3

MicroScan

Phoenix  
MicroScan

# Colistin

## *P. aeruginosa*

	Reference MIC (mg/L)					
	0.5	1	2	4	8	16
$\leq 1$	14	8	11			4
$\leq 2$	2	2	1			
2		6	3			3
4			1			
$\geq 8$						1

3 x Phoenix  
3 x Vitek  
ARIS

# Further work to be performed

- Data analysis
  - Differences between systems
  - Essential agreement (when possible)
  - QC results (3 QC strains included)
  - Correlations for optional agents
  - SIR categorisation by laboratories
  - Disk diffusion vs. BMD
- Gram-positive organisms???

# Thanks!

- All 28 participating laboratories!
- Catherine Webster, Amra Kulic and Jenny Åhman at the EUCAST Development Laboratory.
- The project group: Christian Giske, Truls Leegaard and Ulrik Stenz Justesen.