LABQUALITY

External Quality Assessment Schemes

Blood Culture, round 1, 2018
Blood Culture, screening, round 1, 2018

This is the final report letter and replaces the previously published preliminary report. This report includes also the expert comments on the susceptibility testing results.

Please find enclosed the results of the round. There were 134 participating laboratories out of 18 countries. 45 laboratories participated in screening only whereas 89 laboratories participated in the identification and susceptibility testing.

The content of the lyophilized specimens were as follows:

Specimen 001 (LQ761818011): *Klebsiella pneumoniae* ATCC® BAA-1705™
Specimen 002 (LQ761818012): *Haemophilus influenzae* C120534

The results of the round are presented in summary tables. The grey areas indicate the laboratories´ own results. The susceptibility tests are presented in numerical summaries and as histograms, in which the laboratories´ own results are marked by capital letters corresponding to the SIR-system. The letter points out the millimetre in question. Laboratory specific histograms are drawn for each antimicrobial agent if the laboratory's result is included in a group of at least three (3) results. By "group" is indicated results which are obtained and interpreted according to the same standard (e.g. CLSI, SRGA, BSAC etc.). The results by MIC-method are presented as a summary table in Annex 1.

Please check, that the client code on the printouts showing your results is correct.

For laboratories ordering paper printouts; the laboratory specific numerical summaries and report letters of this round are also available on Labquality´s homepage (www.labquality.fi). Please choose Login to LabScala on the top right-hand corner and fill in your laboratory client code/personal user name and password. Then choose View Reports.

Comments
Specimen 001
Background info: Sepsis. Hospitalized after a car crash accident in Greece.

The specimen contained *Klebsiella pneumoniae.* If the specimen was handled according to the instructions, $>10^3$ of bacteria were transferred into one blood culture bottle.

Growth: Of the 134 laboratories participating in the round, 131 (98%) reported their results before the closing date. Bacterial growth was detected by all of them.
In all 98% (44/45) of the screening laboratories returned their results before the closing date. All of the screening laboratories that reported a gram staining result (28/28) succeeded to interpret the finding correctly as a gramnegative rod.

Identification: In all 86 out of the 89 (97%) laboratories that performed final identification reported their results before the closing date. 99% (85/86) identified the isolate correctly as *K. pneumoniae.* One participant reported merely gramnegative bacteria, which might indicate that they are a screening laboratory.

2018-05-14

FINAL REPORT

Product no. 5100, 5101
LQ761818011-012/US
Subcontracting: sample pretesting

Items dispatched:	2018-03-06
Closing date:	2018-04-03
Expected results:	2018-04-05
Preliminary report:	2018-05-08
Final report:	2018-05-14

The report includes
- the expected results
- comments on the results by the scheme expert
- laboratory specific tables

Request for correction
Typing errors on laboratory's result forms are on laboratory's responsibility. Labquality accepts responsibility only for the result processing. Requests for correction must be notified in writing within one month of receiving the results.

Next round
The next Blood Culture EQA round (2, 2018) will be carried out in May 2018.

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Comments on susceptibility test results
This *K. pneumoniae* strain is recommended by the CLSI as the positive control in carbapenemase tests. It carries a resistance plasmid encoding carbapenemase of KPC type. Due to this resistance mechanism the strain is resistant to carbapenems, I, II, and III generation cephalosporins, aztreonam, and piperacillin/tazobactam. In addition, the strain is resistant to tobramycin, ciprofloxacin and trimethoprim/sulfa. According to literature, KPC producing *K. pneumoniae* is susceptible to ceftazidime-avibactam but resistant to ceftolozane-tazobactam.

In all but a couple of imipenem S interpretations, meropenem and imipenem disk results indicate decreased susceptibility to carbapenems. Meropenem MIC-based interpretations were mostly R (53/58) and in a few cases I (5/58). All but one laboratories reported the strain as carbapenemase-positive (60/86) or possibly/probably positive (25/86). Resistance to tobramycin, ciprofloxacin and trimethoprim/sulfa was correctly reported by all of the participating laboratories.

KPC-mediated carbapenem resistance is most wide-spread carbapenem resistance mechanism among enterobacteria worldwide. KPC belongs to the same class of beta-lactamases as ESBLs and, thus, is to some extent inhibited by clavulanic acid. This feature might lead to a false ESBL interpretation of the beta-lactam resistance mechanism of a KPC-producing strain. With the exception of perhaps one, none of the participants dropped into the pitfall – excellent!

Any strain belonging to the *Enterobacterales* family and showing decreased susceptibility to meropenem or/and imipenem or resistance to ertapenem, must be checked for carbapenemase production.

Table 1. The MIC-results reported by two Finnish reference laboratories of specimen 001, *K. pneumoniae* ATCC® BAA-1705™. The reference laboratories followed the EUCAST guideline.

Antimicrobial agent	**Ref. laboratory 1**		**Ref. laboratory 2**	
	MIC (mg/L)	**SIR**	**MIC (mg/L)**	**SIR**
Amoxicillin-clavulanate	>256	R	48	R
Aztreonam	>256	R	>256	R
Cefotaxime	64	R	N/T	-
Ceftazidime	32	R	24	R
Ceftriaxone	256	R	16	R
Cefuroxime	>256	R	>256	R
Imipenem	24	R	N/T	-
Meropenem	24	R	2	R
Ciprofloxacin	>32	R	>32	R
Tobramycin	16	R	12	R
Trimethoprim-sulfamethoxazole	>32	R	>32	R
Other result	KPC+		KPC+	

Specimen 002
Background info: Elderly patient with pneumonia.

The specimen contained *Haemophilus influenzae.* If the specimen was handled according to the instructions, $>10^3$ bacteria were transferred into one blood culture bottle.

Growth: Of the 134 laboratories participating in the round, 131 (98%) reported their results before the closing date. All but one participant succeeded to detect growth.
In all, 26 out of the 28 screening laboratories that reported a gram staining result had interpreted the finding correctly as a gram-negative rod and one as gram-negative coccobacilli. Moreover, one laboratory reported the finding incorrectly as a gram-positive coccus and one had reported as an additional finding a gram-positive rod.

Identification: 98% (87/89) of the laboratories that performed final identification reported their results before the closing date. In all 94% (82/87) reported the expected finding, *Haemophilus influenzae.* Three laboratories (3%) reported the finding incorrectly as *H. parainfluenzae*. One laboratory (1%) reported the finding

merely as a gram-negative rod; this participant should probably take part in the scheme intended for screening laboratories (5101).
Three additional findings were reported; *Streptococcus sanguinis, Streptococcus salivarius* and *Corynebacterium* sp.

Scoring
General rules
Scoring is implemented for each specimen/finding when 60% or more of the laboratories report a correct/expected result. The scoring range is 0-4 points (p.) and the following general rules are followed:

Laboratories performing final identification:

- 4p. (maximum score) is reached by reporting the expected correct result, or, by reporting a result that is considered sufficient regarding the expected finding
- 1-3p. is given to results that are partly correct/insufficient regarding the expected finding
- 0p. is given for an incorrect/false result or not reporting the results before closing date

Laboratories performing screening/ growth detection:

- 2p. (maximum score) is reached by reporting the expected correct result
- 1p. is given to results that are partly correct/insufficient regarding the expected finding and the examination selection of the laboratory
- 0p. is given for an incorrect/false result or not reporting the results before closing date

Specimen 001

Screening laboratories:	Points (p.):
- Positive/growth (gram staining not in test selection)	2
- Positive/growth (gram staining included in test selection)	1
- Gram-negative rod	2
- Other findings/results	0
Laboratories performing identification:	
- *Klebsiella pneumoniae*	4
- Gram-negative bacteria	0
- Other findings/results	0

Specimen 002

Screening laboratories:	Points (p.):
- Positive/growth (gram staining not in test selection)	2
- Positive/growth (gram staining included in test selection)	1
- Gram-negative rod	2
- Gram-negative coccobacilli	2
- Other findings/results	0
Laboratories performing identification:	
- *Haemophilus influenzae*	4
- *Haemophilus parainfluenzae*	2
- Gram-negative rod	1
- Other findings/results	0

Maximum score for this round is **4p.** for screening laboratories and **8p.** for laboratories performing identification.

Clinical microbiologist Jari Hirvonen, Ph.D., Fimlab Laboratories, has commented on the results of this round. Clinical microbiologist Antti Nissinen, Ph.D., Synlab and Chief Physician Antti Hakanen, M.D., Ph.D., Turku University Hospital, have commented on the susceptibility results.

End of report

ANNEX 1. Blood Culture, round 1, 2018.

The MIC-results reported by the participating laboratories of specimen 001 *Klebsiella pneumoniae* ATCC® BAA-1705™ (KPC+).

Antimicrobial agent	MIC-value (mg/L)	Inter-pretation	Followed standard and reported results					Results in all
			EUCAST	CA-SFM	CLSI	NORDIC AST	Not reported	
Amikacin	16	I	1	1				
	16	R	1					
	>16	R	4	3				
	24	R	1					
	32	R	1					
	>32	R	7	5				
	>=64	R	8	1	2			
	>64	R	5					
	96	R		1				41
Aztreonam	>4	R	1					
	>16	R	1	2				
	>=32	R	1					
	>32	R	4	3				
	48	R	1					
	>=64	R	6	1	2			
	>64	R	1					
	256	R		1				24
Cefepime	2	I	1					
	2	R		1	1			
	4	I		1				
	>4	R		1				
	8	R	2	3	1			
	>8	R	1	2				
	16	R	2					
	>16	R	6					
	32	R	2					
	>=32	R	5					
	>32	R	2					
	>256	R					1	32
Cefotaxime	8	R	1					
	>8	R		1				
	>32	R	1					3
Ceftazidime	>4	R		1				
	>8	R	3	1				
	16	R	6	3	1			
	>16	R	2					
	24	R	1					
	32	R	5					
	>32	R	8	5				
	>=64	R	8		1			
	>64	R	5					
	>512	R		1				51
Ceftazidime-avibactam	0,5	S	2	1				
	0,75	I	1					
	1	S	4	2				10

Antimicrobial agent	MIC-value (mg/L)	Inter-pretation	Followed standard and reported results					Results in all
			EUCAST	CA-SFM	CLSI	NORDIC AST	Not reported	
Ceftolozane-tazobactam	12	R	1					
	16	R		1				
	24	R	1					
	32	R	3	2				
	>32	R	1					
	48	R	2	1				
	64	R	1					
	96	R	1					14
Ceftriaxone	>2	R	1					
	>4	R	1	1				
	8	R	2					
	16	R	1	1	1			
	32	R	1	2				
	>32	R	2	1				
	48	R	2					
	64	R	1					
	>=64	R	4	1	1			
	>64	R	4					
	>256	R	1				1	29
Ciprofloxacin	>0,5	R	1					
	>1	R	2	2				
	>2	R	9	7				
	>=4	R	12	1	2			
	>4	R	11					
	>32	R	1					
	>128	R		1				49
Colistin	0,125	S	3	1				
	0,25	S	6	1				
	<=0,5	S	3	1	1			
	0,5	S	6	1				
	<=1	S	1					
	1	S	3					
	1,5	S	2					
	2	S	1					
	3	R					1	31
Ertapenem	>4	R	1					
	>32	R	2					3
Gentamicin	0,5	S	1					
	0,75	S	1					
	<=1	S	1	2	1			
	1	S	2					
	1,5	S	2					
	<2	S		1				
	<=2	S	2					
	2	S	6	2	1			
	4	S		1	1			
	4	I	13	5				
	4	R	1					43

Antimicrobial agent	MIC-value (mg/L)	Inter-pretation	Followed standard and reported results					Results in all
			EUCAST	CA-SFM	CLSI	NORDIC AST	Not reported	
Imipenem	0,5	S		2				
	0,5	I		1				
	4	I	2	2				
	4	R		1				
	8	I	3	4				
	8	R			1			
	>8	R	7	3				
	12	R	1	1				
	16	R	2					
	>=16	R	5	1	2			
	32	R	2					
	>32	R	1	1			1	43
Levofloxacin	>2	R	3	1				
	>4	R	2	3				
	>=8	R	2	1	2			
	>8	R		1				
	>32	R	1					16
Meropenem	2	I	1	1				
	2	R				1		
	4	I	2					
	6	I	1					
	8	I	1					
	>8	R	7	5				
	16	R	5					
	>=16	R	13	1	3			
	>16	R	5					
	32	R	4					
	>32	R	6	1			1	58
Netilmicin	>8	R		1				
	128	R	2					3
Piperacillin-tazobactam	>16	R	1	1				
	>16/4	R	2					
	>32	R	3					
	>=64	R	1					
	>64	R	8	8				
	>64/4	R	1					
	>=128	R	11	1	3			
	>128	R	8	1				
	>256	R	1				1	51
Tigecycline	0,5	S	1					
	1	S	4					
	2	I	5	1				
	3	R	1					
	4	S	1					
	4	I			1			
	4	R	10	2				26

Antimicrobial agent	MIC-value (mg/L)	Inter-pretation	Followed standard and reported results					Results in all
			EUCAST	CA-SFM	CLSI	NORDIC AST	Not reported	
Tobramycin	>4	R	3	2				
	>8	R	7	5				
	12	R	1					
	>=16	R	10		2			
	>16	R	11	1				42
Trimethoprim-sulfa.	>4	R	3	3				
	>4/76	R	4					
	>8	R	2	1				
	>=16	R	1		1			
	>16	R	6					
	>32	R	2					
	>160	R	5	6				
	>=320	R	9	1	2			
	>320	R	4					50
total			438	141	33	1	6	**619**