## MEDICAL MICROBIOLOGY

## Raymond H.K. Leung, W.T. Hui, H.W. Lo, Ami M.Y. Fung

The Hong Kong Institute of Medical Laboratory Sciences Association Quality Assurance Programme Limited (HKIMLSQAP) (Formerly Medical Technology Association Quality Assurance Programme (HKMTAQAP)) in Medical Microbiology was first introduced in 1990 and consists of 2 sections: bacterial identification and antimicrobial susceptibility testing. In order to assist participants in analysing their performance, a score is given for each result. In bacterial identification, scores of 2 (or 4) are given for fully correct results, 1 (or 2/3) for partially correct results, 0 for negative results and -1 for wrong results. For antimicrobial susceptibility testing, scores of 1 are given for correct results, 0 for incorrect results and NS for Not-scored results.

### I. Participants

The total number of Hong Kong and Macau participants for 2008 survey was 31.

	Hong Kong	Macau
Government Laboratory	1	1
Public Hospital Laboratory	9	0
Private Laboratory	8	1
Private Hospital Laboratory	11	0

Table 1 shows the number and types of laboratories registered in 2008.

### II Survey Material Distribution

Each year sixteen survey samples were sent in 4 surveys. In each distribution, each participating laboratory was provided with 4 lyophilised samples, 3 for bacterial identification and 1 for antimicrobial susceptibility testing together with a Return Form.

## i Bacteriological Identification

Simulated specimens consisted of pure culture or mixtures of bacteria were sent for identification. The survey materials distributed and participants' performance are listed in Table 2.

In 2008, a colourful variety of organisms were sent out for identification. The mean percentage of fully correct results for 2008 was 85%. Participants did very well with organisms such as *Pseudomonas aeruginosa* (MM 2801), *E. coli* O157 (MM 2802), *Streptococcus pneumoniae* (MM 2803), *Salmonella paratyphi A* (MM 2805), *Staphylococcus aureus* (MM 2810),

*Streptococcus suis* (MM 2813) and *Yersinia enterocolitica* (MM 2814) with an all-correct percentage of greater than 85%.

a. MM 2806 was *Pseudomonas fluorescens*. This organism was sent out after a blood bag contamination episode. The Microbiology panel decided that participating laboratories should have a first hand look at this particular organism. 81% of laboratories got the correct answer.

b. All participants were able to obtain the correct results for specimens MM 2801 (*Pseudomonas aeruginosa*) and MM 2810 (*Staphylococcus aureus*).

c. Participants also performed surprising well for MM 2813 (*Streptococcus suis*) as this organism cannot be identified by some automation systems. This organism is also not extensively described in the American literature. However, 90% (28/31) got the correct answer.

d. MM 2807 was *Prototheca wickerhami*. Only 61.3 % (19/31) of participants were able to give the correct answer. This may be attributed to participants rarely encountering this organism. Interested readers may refer to 2008 Survey Report 2 for more details in identification.

e. MM 2811 (Salmonella typhimurium) was not scored due to lack of participants' consensus.

f. MM 2809 was *Candida tropicalis*. 84% (26/31) of the participants gave the correct answer for this fungus strain.

g. MM 2814 (*Yersinia enterocolitica*), another uncommon organism was identified by 97% of participating laboratories.

h. Lastly, MM 2815 was a mixture of *Streptococcus agalactiae* and *Listeria monocytogenes*. Only 61% returned both organisms. A number of laboratories gave only one organism. This may be due to the similarity in macroscopic appearance of these two organisms. Therefore, laboratories should be more aware of the presence of mixed pathogens in doing culture examinations.

Table 2

Survey	Intended	Number of Laboratory Score					Number of reporting		
sample	Result	4 3 2 1 0 -1 N						Laboratories	
MM 2801	Pseudomonas	0	0	31(100%)	0	0	0	0	31
MM 2802	aeruginosa E. coli O157	0	0	27(87%)	0	4	0	0	31
MM 2803	Streptococcus pneumoniae	0	0	30(97%)	0	0	1	0	31
MM 2805	Salmonella paratyphi A	0	0	30(97%)	1	0	0	0	31
MM 2806	Pseudomonas fluorescens	0	0	25(81%)	1	3	2	0	31
MM 2807	Prototheca wickerhami	0	0	19(61%)	0	10	2	0	31
MM 2809	Candida	0	0	26(84%)	1	3	1	0	31
MM 2810	Staphylococcus aureus	0	0	31(100%)	0	0	0	0	31
MM 2811*	Salmonella typhimurium	-	-	-	-	-	-	31	31
MM 2813	Streptococcus suis	0	0	28(90%)	0	0	3	0	31
MM 2814	Yersinia enterocolitica	0	0	30(97%)	0	1	0	0	31
MM 2815	Streptococcus agalactiae and Listeria monocytogenes	19(61%)	4	6	2	0	0	0	31

\* MM 2811 was not scored due to lack of participants' consensus.

# Interpretative Quality Assurance Program (IQAP) with the Hong Kong College of Pathologists.

This program consisted of clinical questions set on 2 bacterial identification samples on each survey. The IQAP aims at monitoring the standard of practising pathologists. Therefore, only those laboratories already registered with the College of Pathologists participated in this programme. This programme currently has a total of 8 participants.

#### ii Antimicrobial Susceptibility Testing

Pure cultures were sent to individual laboratories for antimicrobial susceptibility testing. The survey results are shown in Table 3.

The methods and techniques used by participating laboratories are not shown since laboratories used various methods for susceptibility testing.

Table 3

				Numbe	r of Laborato	ries
Survey			Intended			Not
Sample	Test Organism	Test Agent	Result	Correct	Incorrect	Tested
MM 2804	Enterococcus faecalis	Ampicillin	Sensitive	29(97%)	1	1
	•	Vancomycin	Sensitive	26(84%)	5	0
		High content Gentamicin	Sensitive	20(95%)	1	10
		High content Streptomycin	Sensitive	14(93%)	1	16
MM 2808	Streptococcus agalactiae	Erythromycin	Resistant	31(100%)	0	1
	C	Penicillin	Sensitive	29(94%)	2	0
		Tetracycline	Resistant	30(100%)	0	1
MM 2812	Staphylococcus aureus	Penicillin	Sensitive	30((100%)	0	1
		Methicillin	Sensitive	30(100%)	0	1
		Erythromycin	Sensitive	29(97%)	1	1
		Cephalothin	Sensitive	24(100%)	0	7
		Gentamicin	Sensitive	31(100%)	0	0
		Vancomycin	Sensitive	30(97%)	1	0
MM 2816	Haemophilus influenzae	Ampicillin	Resistant	25(86%)	4	2
		Augmentin	Resistant	24(80%)	6	1
		Chloramphenicol	Sensitive	27(96%)	1	3
		Tetracycline	Sensitive	22(76%)	7	2
		Cefotaxime	Sensitive	23(88 %)	3	5
		Cefuroxime	Resistant	27(90%)	3	1
		Beta-lactamase	Negative	24(100%)	0	7

### III Performance Analysis

Inter-laboratory comparisons were based on results shown in Tables 2 and 3. A performance rating representing individual laboratory performance was calculated using the formula shown below:

Cumulative score of the lab	minus	Mean cumulative score of all labs.
examining the same specimen		examining the same specimen.
Standard deviation of the cumulative sc	ore of all laborator	ries examining the same specimen

Thus laboratories with positive performance rating were doing better than average, laboratories with a performance rating of 0 were performing the same as average and laboratories with negative rating were performing worse than average. Laboratories with a performance rating of - 1.96 standard deviation below the mean were considered to have performed significantly worse than average.

## i Bacteriological Identification

Of the 341 results returned for the 11 specimens used in the analysis, 296 (86.8%) were given a score of 2 (or 4 for MM2815) (fully correct), 15 (4.39%) were given a score of 1 (or 1, 2, & 3 for MM2815) (partially correct), 21 (6.16%) were given a score of 0 (negative) and 9 (2.64%) were given a score of -1 (wrong). There was one participant with a performance rating of below -1.96.

## ii Antimicrobial Susceptibility Testing

Of the 124 reports received for the 4 specimens, 524 (93.57%) were correct and 36 (6.43%) were wrong. There was one participant with a performance rating of below -1.96.