MEDICAL MICROBIOLOGY

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The Hong Kong Institute of Medical Laboratory Sciences Association Quality Assurance Programme Limited (HKIMLSQAP) formerly Hong Kong Medical Technology Association Quality Assurance Programme (HKMTAQAP) in Medical Microbiology was first introduced in 1990 and consists of two sections: bacterial identification and antimicrobial susceptibility testing. In order to assist participants in analysing their performance, a score was given for each result. In bacterial identification, scores of two were given for fully correct results, one for partially correct results, zero for negative results and -1 for wrong results. For antimicrobial susceptibility testing, score of one was given for correct results, zero for incorrect results and NS for not scored results. Survey reports were issued quarterly to the participating laboratories documenting the performance, whereas late and nil returns were marked on the individual reports. Year-end summaries of the total scores of individual laboratories in identifying the micro-organisms and antibiotic susceptibility testing were compiled and released.

I. Participants

The total number of participants was 33. Table 1 shows the breakdowns of participants with respect to the types, service sectors and localities in year 2011.

	Local	Overseas
Government Laboratory	1	2
Public Hospital Laboratory	9	0
Private Laboratory	11	0
Private Hospital Laboratory	9	1

II Survey Material Distribution

Sixteen survey samples were sent in four surveys. In each distribution, each participating laboratory was provided with four lyophilised samples, three for bacterial identification and one for antimicrobial susceptibility testing together with a result return form.

i Bacteriological Identification

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

A diverse variety of organisms was sent out for identification. These included not only relatively fastidious organisms but also rarely encountered organisms including *Clostridium tetani* and *Corynebacterium diphtheriae*.

A majority of participants were competent in identifying the organisms, namely *Neisseria meningitidis* (MM 1101), *Candida glabrata* (MM 1102), *Salmonella paratyphi B* (MM 1103), *Proteus penneri* (MM 1105), *Aggregatibacter aphrophilus* (MM 1107) and *Staphylococcus lugdunensis* (MM 1115) with a full score percentage of 80% or above.

An educational sheet on MM 1103 (*Salmonella paratyphi B var* java), which was successfully identified by 81.8% of participants, were disseminated for reference.

In the identification of rarely encountered organisms, it was noteworthy that 93.75% and 87.5% of participants managed to identify *Corynebacterium diphtheriae* (MM 1114) and *Clostridium tetani* (MM 1111), respectively.

- An educational strain, *Bordetella parapertussis* (MM 1106) was despatched in the second survey. The performances of participants were not scored, however 65.6 % of participants were capable to identify the organism.
- b. MM 1110 is a mixed culture of *Proteus mirabilis* and *Pseudomonas aeruginosa*. Only 59.4% of participants got the full score of four.
- c. MM 1109 is a mixed culture of *Enterococcus faecalis* and *Candida albicans*. A full of four was evident in 75% of participants.

Survey sample	Intended Result	Number of Laboratory Score						Number of	
		4	3	2	1	0	-1	Ν	reporting Laboratories
MM 1101	Neisseria meniningitis (Serogroup B)			31 (93.9%)	0	0	2 (6.1%)	0	33
MM 1102	Candida glabrata			27 (81.8%)	0	5 (15.2%)	1 (3.0%)	0	33
MM 1103	Salmonella paratyphi B			27 (81.8%)	2 (6.1%)	4 (12.1%)	0	0	33
MM 1105	Proteus penneri			30 (93.8%)	1 (3.1%)	1 (3.1%)	0	0	32
MM 1106	Bordetella parapertussis	(Educational purpose only) Not Scored					32		
MM 1107	Aggregatibacter aphrophilus			27 (84.4%)	0	2 (6.3%)	3 (9.3%)	0	32
MM 1109	Enterococcus. faecalis Candida albicans	24 (75%)	1 (3.1%)	5 (15.7%)	1 (3.1%)	1 (3.1%)	0	0	32
MM 1110	Proteus mirabilis Pseudomonas aeruginosa	19 (59.4%)	0	12 (37.5%)	1 (3.1%)	0	0	0	32
MM 1111	Clostridium tetani			28 (87.5%)	0	4 (12.5%)	0	0	32
MM 1113	Klebseilla pneumoniae			31 (96.87%)	1 (3.1%)	0	0	0	32
MM 1114	Corynebacterium diptheriae			30 (93.75%)	0	0	2 (6.2%)	0	32
MM 1115	Staphylococcus lugdunensis			28 (87.6%)	1 (3.1%)	1 (3.1%)	2 (6.2%)	0	32

Table 2. Performance of participants

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

Clinical questionnaires were set on two survey samples for bacterial identification on each survey, which aimed at the clinical inferences made by presiding pathologists of the participating laboratories. Currently, there were eight participants enrolled to IQAP.

ii Antimicrobial Susceptibility Testing

Pure cultures were employed for antimicrobial susceptibility testing. The survey results are shown in Table 3. The various methods and techniques used by participating laboratories are not shown.

Survey		Test Agent	Intended	Number of Laboratories			
Sample	Test Organism		Result	Correct	Incorrect	Not Tested	
MM 1104	Streptococcus agalactiae	Penicillin	Sensitive	31 (93.9%)	2 (6.1%)	0	
		Erythromycin	Resistant	29 (87.9%)	3 (9.05%)	1 (3.05%)	
		Tetracycline	Resistant	31 (93.9%)	1 (3.05%)	1 (3.05%)	
MM 1108	Streptococcus agalactiae	Penicillin	Sensitive	31 (96.9%)	1 (3.1%)	0	
	5	Erythromycin	Resistant	29 (90.6%)	2 (6.3%)	1 (3.1%)	
		Clindamycin	Sensitive	22 (68.7%)	4 (12.5)	6 (18.8%)	
		Vancomycin	Sensitive	30 (93.7%)	2 (6.3%)	0	
MM 1112	Streptococcus pneumoniae	Penicillin	Resistant	26 (81.3%)	4 (12.5%)	2 (6.2%)	
	1	Ceftriazone	MIC determination	Not Scored			
		Vancomycin	Sensitive	30 (93.7%)	0	2 (6.3%)	
MM 1116	Staphylococcus lugdunensis	Methicillin	Sensitive	28 (87.4%)	2 (6.3%)	2 (6.3%)	
	C	Gentamicin	Sensitive	31 (96.9%)	0	1 (3.1%)	
		Erythromycin	Sensitive	30 (93.7%)	0	2 (6.3%)	
		Clindamycin	Sensitive	27 (84.4%)	0	5 (15.6%)	
		Co-trimoxazole	Sensitive	28 (87.4%)	0	4 (12.5%)	
		Vancomycin	Sensitive	31 (96.9%)	0	1 (3.1%)	

Table 3. Survey results

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 following formula:

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 score of all laboratories examining the same specimen

A participant having a positive rating performs better than peers with a rating of zero. Likewise, the performance of a participant of a negative rating is inferior to counterparts with an average score of zero. The performance of a participant scoring an accumulative index of -1.96 standard deviation is considered to be below an average. Critical reviews of the institutional standard operation procedure and policy are highly recommended.

i Bacteriological Identification

Among 355 results on the 11 survey specimens (one survey sample was not scored as it was an educational strain), 302 (85.07%) were fully correct and given full score, 22 (6.197%) were partially correct and given a partial score, 18 (5.07%) were given a score of zero and 10 (2.816%) were wrong and given a negative score of -1. There were two participants having an accumulative performance index below -1.96.

ii Antimicrobial Susceptibility Testing

Among 455 results on the four survey samples, 434 (95.38%) were correct and 21 (4.61%) were wrong. One participant was noted having an accumulative performance index below -1.96.

IV Laboratory Performance Report

Each participant was issued an individual laboratory performance report for interlaboratory comparability (Appendix 1).

References

- James P. Nataro, Cheryl A. Bopp, Patricia I. Fields, James B. Kaper, and Nancy A. Strockbine. Chapter 35. *Escherichia*, *Shigella*, and *Salmonella*. Manual of Clinical Microbiology, ASM Press, 10th Edition.
- Antigenic formulae of the *Salmonella serovars*, 2001. WHO Collaborating Centre for Reference and Research on *Salmonella* Michel Y. Popoff Institut Pasteur, 28 rue du Dr. Roux, 75724 Paris Cedex 15, France.

Appendix 1

HONG KONG MEDICAL TECHNOLOGY ASSOCIATION QUALITY ASSURANCE PROGRAMME

MEDICAL MICROBIOLOGY

EVALUATION OF LABORATORY PERFORMANCE (2011)

Laboratory code: XXX

Bacterial identification:

Total number of specimens investigated by your laboratory:	12
Your cumulative score for the above specimens:	28
Mean cumulative score of all laboratories examining same specimens:	23.75
The standard deviation of cumulative score of all laboratories:	6.38
Your cumulative score is 0.67 standard deviations <u>above</u> the mean.	

Antibiotic susceptibility testing:

Total number of antibiotic susceptibility tests performed by your laboratory:	15
Your cumulative score for the above tests:	15
Your percentage of correct for the above tests:	100%
The mean percentage of correct among all laboratories:	94.64%
The standard deviation of the percentage of correct among all laboratories:	12.4
Your percentage of correct is 0.43 standard deviations above the mean.	

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