CLINICAL CHEMISTRY

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I. Participants

HKIMLSQAP has operated steadily in 2009-2010. There were 46 participants joined the program. One new participant joined the program. The increase of numbers of laboratories joining the program implies the acceptance of the program in the community. Certificates of attendance have been sent to all participants. The annual cycle of survey of 12 monthly exercises starts at July and ends by June of the following year. Table 1 shows the statistics of participants in the past two cycles.

Table 1. Types of laboratories participated in the Clinical Chemistry of HKIMLSQAP in years 2008 and 2009.

Laboratories	**Participants in**	
	2008-2009	**2009-2010**
Public hospitals & Institute of Hospital Authority	6	7
Private Hospitals	10	10
University Laboratories	2	2
Private Laboratories	27	27
Total	**45**	**46**

HKIMLSQAP is a useful tool for continuous monitoring of laboratory performance. However, a small number of participants may limit the effectiveness of such program especially when there is a likely biased result from any laboratory. HKIMLSQAP is aware of the possible clustering constraint and collaborate with Bio-Rad EQAS of a relatively bigger cohort of participants in such a way that HKIMLSQAP participants not only can learn their own performance but also comprehend the quality and standards of both their local and international peers. HKIMLSQAP participants can refer to the coefficient of variation (CV) of an analyte derived from Hong Kong subgroup and the CV of overall Bio-Rad participants worldwide for comparison (Table 2). This may help provide additional information for HKIMLSQAP participants in understanding the quality performance of one's laboratory.

Table 2. Comparison of coefficients of variation (CV%) of analytes derived from all methods used by HKIMLSQAP participants to those derived from all participants at large.

Analytes	Mode	H.K. Subgroup		All Bio-Rad participants	
		N	Average CV	N	Average CV
Albumin					
Bromocresol Purple	1	13	3.2	356	4.1
Bromocresol Green	2	68	6.6	1772	7.4
Bicarbonate (CO2)					
All Results	1	26	12.0	481	12.3
Bilirubin, Total					
Sulphanilic Acid Methods / Diazonium Ion Methods	1	27	9.0	2043	10.6
Dual Wavelength Reflectance Spectrophotometry	2	14	7.4	213	9.7
Calcium, Total					
All Results	1	37	5.1	1936	5.5
Chloride					
All Results	1	34	3.0	1785	3.6
Cholesterol, Total					
All Results	1	40	6.1	2290	5.7
HDL Cholesterol					
Mode 1	1	9	12.3	1778	12.6
Mode 2	2	28	5.1	191	6.9
Creatinine					
Non-Compensated Creatinine Methods	1	34	5.8	1730	8.5
Compensated Creatinine Methods	2	3	3.1	149	17.0
IDMS-traceable calibrators	3	4	4.3	522	6.7
Glucose					
All Results	1	43	3.7	2370	5.0
Iron					
Mode 1	1	20	9.7	979	14.1
J & J Mtd	2	12	26.4	194	24.8

Magnesium					
All Results	1	20	7.7	1236	10.8
Phosphate					
Mode 1	1	36	12.2	1546	9.8
Beckman Mtd	2	0	N.A.	128	N.A.
Potassium					
All Results	1	40	4.1	2040	5.0
Protein, Total					
Beckman	1	0	N.A.	97	N.A.
Mode 2	2	41	6.4	2066	5.6
Sodium					
All Results	1	40	2.1	2028	2.5
Triglycerides					
Lipase/Glycerol Kinase Methods with glycerol correction	1	1	N.A.	323	10.1
Lipase/Glycerol Kinase Methods without glycerol correction	2	39	7.8	1925	7.8
Urea					
J & J Mtd	1	26	3.7	233	5.0
Mode 2	2	15	7.2	2094	7.3
Uric Acid					
All Results	1	40	5.8	2215	6.8
Alanine Aminotransferase					
UV without P5P	1	13	8.2	1426	8.2
UV with P5P	2	28	4.6	851	7.1
Alkaline Phosphatase					
AMP / Tris	1	15	13.5	1180	13.0
Mode 2	2	26	11.2	645	12.8
DEA	3	0	N.A.	327	N.A.
Amylase					
Dyed Amylopectin	1	9	6.6	268	10.3
Nitrophenyl Linked Substrates	2	8	5.0	1011	9.2
2-Chloro-p-nitorphenyl Linked Substrate	3	14	4.9	362	8.2
Asparatate Aminotransferase					
UV without P5P	1	13	7.2	1473	8.0

UV with P5P	2	15	6.8	580	8.9
Vitros/Fusion-Dry Slide	3	13	4.6	178	5.9
Creatine Kinase					
U.V. Methods (not NAC Activated)	1	22	13.9	1457	12.8
U.V. Methods (NAC Activated)/Colorimetric Methods (Vitros/Fusion-Dry Slide)	2	10	4.7	204	7.7
Gamma-Glutamyl Transferase					
γ-Glutamyl-4-nitroanilide Substrate	1	2	N.A.	383	14.4
γ-Glutamyl-3-carboxy-4-nitroanilide Substrate	2	23	9.7	1139	11.3
J & J Mtd	3	13	3.7	180	4.2
Lactate Dehydrogenase					
Lactate → Pyruvate	1	18	10.7	916	12.1
Pyruvate → Lactate	2	4	29.7	516	24.1
J & J Mtd	3	9	3.8	175	8.0
TSH					
Non-Isotopic Methods	1	25	8.9	693	12.6
Vitros Eci	2	8	3.4	25	4.7
T4, Total					
All Results	1	31	7.9	510	11.8
Beckman coulter/Roche analyzer with 3 rd party reagent	1	2	13.1	203	22.6
Abbott / Roche / bioMerieux	2	19	11.9	261	17.6
Vitros ECi	3	6	8.2	25	21.5
Bilirubin, Direct					
Diazotized Sulfanilic Acid, Dimension	1	10	12.7	421	16.4
Diazotized Sulfanilic Acid, Roche analysers	2	2	17.5	725	14.1
Diazotized Sulfanilic Acid, Abbott analyzers/Roche analysers with 3rd party reagent/ Any other method	3	7	19.9	596	26.6
Vitros/Fusion-Dry Slide	4	7	68.7	74	64.7
Calcium, Ionized					
All Results	1	8	10.6	254	26.6

Lipase					
Colorimetric, Abbott/Roche	1	2	6.5	524	17.8
Enzymayic with Colipase, Vitros	3	5	3.8	148	8.2
Lithium					
ISE, Roche, AVL	1	1	1.1	180	8.9
Colorimetric Methods, Vitros/Fusion-Dry Slide	2	5	2.6	61	9.8
Osmolality					
All Results	1	8	2.3	223	9.1
Amylase, Pancreatic					
Blocked Maltoheptaoside	2	1	N.A.	50	5.7
Undefinded	N.A.	2	N.A.	N.A.	N.A.
Iron Binding Capacity, Total					
Mode 1	1	16	5.9	601	12.7
J & J Mtd	2	6	11.1	59	9.8

II. Results and Discussion

The average CVs are calculated from six random subgroup reports of Cycle 8 (2009-2010). The calculation is made on CVs of analytes derived from different method groups of all participants throughout the cycle. Statistical analysis is not applicable if there are less than three participants.

The overall performance of the cycle is satisfactory. In Table 2 it is noted that the average CVs of all analytes of Hong Kong subgroup are either lower than or comparable to those average CVs of all participants except for phosphate, total protein, LDH (Pyruvate → Lactate) and direct bilirubin. The lower values of CVs of local participants suggest a better performance compared to the international counterparts.

For inorganic phosphates and total protein, HKIMLSQAP participants using different analyzers are grouped together giving rise to higher values of CV.

CVs of LDH (Pyruvate → Lactate) derived from both Hong Kong subgroup and all participants are very high. The value of Hong Kong subgroup is even higher than that of all participants. The poor precision may be attributed to the integrity of the survey materials and the variance in measurement of activity over time. Laboratory managers are advised to look into the matter and review the analytical procedure.

CVs of direct bilirubin derived from Hong Kong subgroup using Ortho Vitros/Fusion-Dry Slide and all participants are unreasonably high. Both HKIMLSQAP and the collaborator are investigating the issue. CVs derived from all other method groups are over 10%. The high readouts may be attributable to poor storage, inaccurate standardization of calibrators and inadequate protection of the light-sensitive survey material.

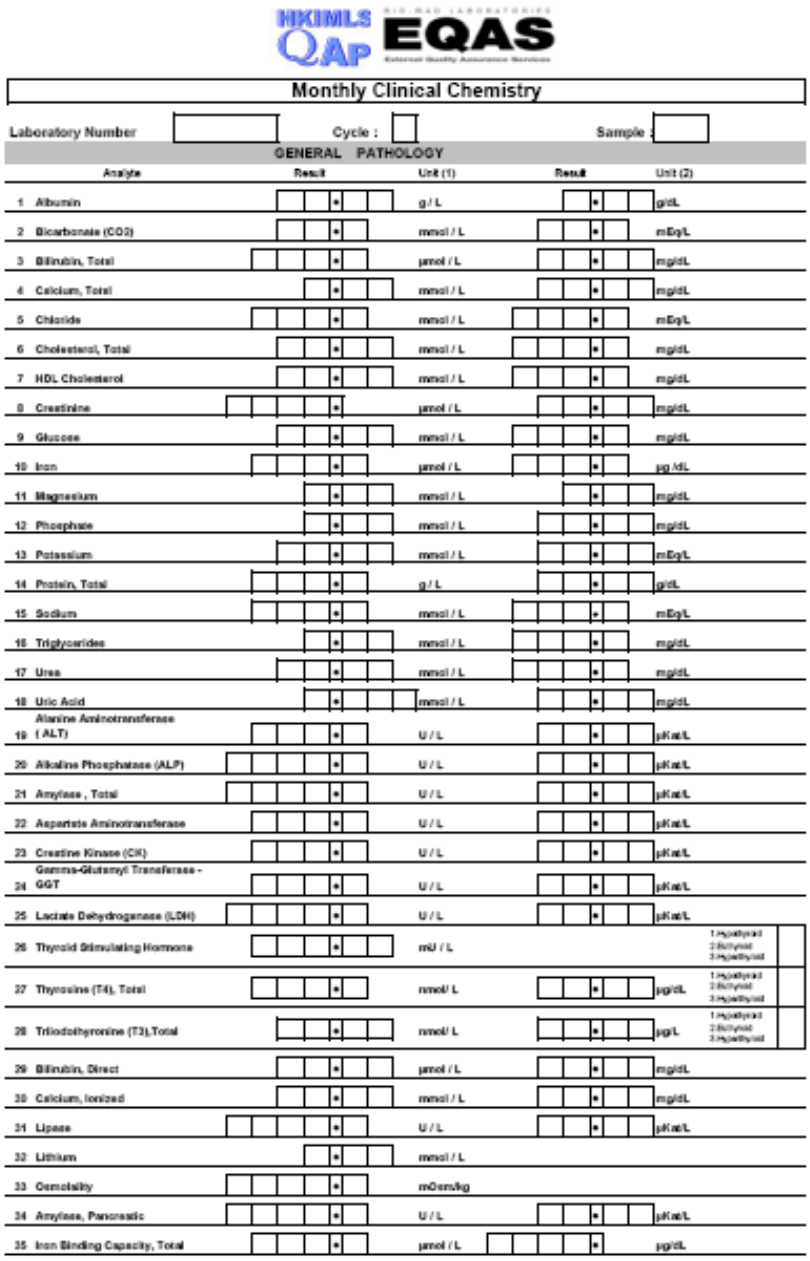
III. Continuous Improvement

In the past cycle of survey we received a substantial number of feedbacks and complaints from participants regarding the transcription errors. Amendments of survey reports were made accordingly. All the reporting errors were attributed to the mistake made during data transcription. As a means of improvement, electronic submission of survey results via the internet was introduced. The template of an electronic survey return form is introduced (Figure 1), which can be downloaded from the HKIMLS homepage at http://www.hkimls.org. Participants are requested to enter the confidentiality code, cycle number and sample number. Analytical results can be entered into the pertinent boxes together with comment under the heading of clinical assessment, if necessary. The survey return report is then transmitted to HKIMLSQAP Office at qap_info@hkimls.org on or before the due date of each month. An e-mail of acknowledgment is sent upon receipt of the data file. It helps minimize the illegibility. The panel encourages all participants to adopt the electronic mode of data submission to minimize the episodes of transcription error. Besides, the panel has also reminded the collaborator to keep a close eye on the process of data transcription.

IV. Conclusion

Quality assurance program is an indispensable tool to monitor the performance of modern medical laboratories in delivering quality services. HKIMLSQAP serves as an available platform for medical laboratories in our local community to review their performance among local and global peers. HKIMLSQAP will continue to strengthen the international link between Hong Kong and other countries by sharing experience, promoting quality and standards, avoiding errors and pursuing excellence. With the close cooperation among the participants, HKIMLSQAP and the collaborator, wish that program can meet the expectation of participants and achieve the goal to improve the quality management of laboratory services.

Figure 1. Electronic submission template of the survey return form



HKIMLS QAP EQAS

Monthly Clinical Chemistry

Laboratory Number | Cycle : | Sample :

GENERAL PATHOLOGY

	Analyte	Result	Unit (1)	Result	Unit (2)
1	Albumin		g / L		g/dL
2	Bicarbonate (CO2)		mmol / L		mEq/L
3	Bilirubin, Total		µmol / L		mg/dL
4	Calcium, Total		mmol / L		mg/dL
5	Chloride		mmol / L		mEq/L
6	Cholesterol, Total		mmol / L		mg/dL
7	HDL Cholesterol		mmol / L		mg/dL
8	Creatinine		µmol / L		mg/dL
9	Glucose		mmol / L		mg/dL
10	Iron		µmol / L		µg /dL
11	Magnesium		mmol / L		mg/dL
12	Phosphate		mmol / L		mg/dL
13	Potassium		mmol / L		mEq/L
14	Protein, Total		g / L		g/dL
15	Sodium		mmol / L		mEq/L
16	Triglycerides		mmol / L		mg/dL
17	Urea		mmol / L		mg/dL
18	Uric Acid		mmol / L		mg/dL
19	Alanine Aminotransferase (ALT)		U / L		µKat/L
20	Alkaline Phosphatase (ALP)		U / L		µKat/L
21	Amylase , Total		U / L		µKat/L
22	Aspartate Aminotransferase		U / L		µKat/L
23	Creatine Kinase (CK)		U / L		µKat/L
24	Gamma-Glutamyl Transferase - GGT		U / L		µKat/L
25	Lactate Dehydrogenase (LDH)		U / L		µKat/L
26	Thyroid Stimulating Hormone		mU / L		1.Hypothyroid 2.Euthyroid 3.Hyperthyroid
27	Thyroxine (T4), Total		nmol/ L		pg/dL 1.Hypothyroid 2.Euthyroid 3.Hyperthyroid
28	Triiodothyronine (T3),Total		nmol/ L		pg/L 1.Hypothyroid 2.Euthyroid 3.Hyperthyroid
29	Bilirubin, Direct		µmol / L		mg/dL
30	Calcium, Ionized		mmol / L		mg/dL
31	Lipase		U / L		µKat/L
32	Lithium		mmol / L		
33	Osmolality		mOsm/kg		
34	Amylase, Pancreatic		U / L		µKat/L
35	Iron Binding Capacity, Total		µmol / L		µg/dL

References

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