STAT TESTS SERVICE AND QUALITY CONTROL AT HAMAD MEDICAL CORPORATION DOHA

A. SATTARKHAN
Consultant biochemist, Hamad Medical Corporation, Doha, State of Qatar

Background: The recognition and validity of laboratory results can better be judged by its internal and external quality control systems. Here we report an internal quality check of the stat service provided to the inpatients at Hamad Medical Corporation, Doha, State of Qatar. ***Methods:*** Periodic internal quality control of nine chemist) analyses, BUN, Na, K, Cl, Ca, Co2, Glucose. Creatinine and Bilirubin were made on auto-analyzer Astra VIII. BIORAD Normal and Abnormal (Chemistry Control) and immunoassay level l.2and 3 were employed. All results falling within 2 SD were accepted. *Results:* 2 SD% for chemistry Normal and Abnormal ranged from 61.5% to 85.5% and 92.0% to 98.8% and for hormones Immunoassay level 1.2. and 3 from 92.7% to 100% respectively.

INTRODUCTION

The recognition and validity of laboratory results can better be judged by its quality control system. There are two types of quality controls internal and external. It is imperative of a standard laboratory to participate in these programs. Internal quality control programs play a vital role in assessing the performance and consequently building confidence in laboratory results. On the other hand, external quality control system is important to compare our results with other laboratories using same methodologies and instrumentation[1].

Various national and external quality control programs have been available for many years. To improve the quality of health, the Ministry of health of Malaysia has introduced quality assurance and national external quality assessment scheme for clinical chemistry since 1985'. Middle East external quality assessment scheme for various hormones was started in Saudi Arabia in I986[3]. National quality assessment scheme established in Thailand in 1986 has been analyzing all biochemistry tests by a variety of different methods'[1]. Cuba has computerized external quality control programme for primary lab care since I990[5]. In Zimbabwe external quality assessment scheme is running since 1990 to improve chemical pathology practice and to assess suitability of ethylene glycol stabilized bovine serum as EQAS material[6]. In Australia quality assessment programs have been designed to improve the quality while at the same time providing comprehensive statistical analysis ad peer review[7].

Total quality assurance depends on technical, non-technical functions pre and post analytical phases and regular sample audits on randomly selected requests[8]. In-spite of its maturity the UK external quality assessment system still has many misconceptions needed to be clarified[9]. Beside routine analysis, little attention to the emergency clinical tests has been paid[1011] which prompted us to prepare a report on our stat service provided to the inpatients at Hamad Medical Corporation. Doha, State of Qatar.

MATERIALS AND METHODS

Blood samples drawn from the patients in various wards of Hamad Medical Corporation bearing appropriate l>D> were collected. Sera from the respective samples were prepared by centrifugation and analysed for chemistry on auto analyzer ASTRA VIII,

For chemistry BIORAD Lyphocheck Normal and Abnormal Controls, while for hormones. Immunoassay Control level 1,2 and 3 were used. Sets of chemistry controls one each for the morning, afternoon and night shift assayed respectively. The programme was carried over for a period of four months, and results obtained were recorded.

RESULTS

The results of this study are shown in table-1.

Table-1: Values of Different Chemistry analytes obtained for Morning, Afternoon and Night shift using Normal controls

S. No	Analytes	Mean	ISO	2SD	CV
1	BUN-M	5.73 ±0.15	5.58 5.88 -65.6	5.43 6.03 -98.7	2.8
	BUN-AN	5.75 ±0.12	5.63 5.87 -75.7	5.51 5.99 -95.8	2.34
	BUN-N	5.77 ± 0.15	5.65 5.92 -79.3	5.47 6.07 (94 4)	2.97
2	Na-M	137 55 ± 1.15	136.4 138.7 -77.8	135 25 139.85 (96.0)	0 85
	Na-AN	136.1 ± 1.2	134.9 137.3 -71.8	133.07 138.5 -97	0.88
	Na-N	136.3 ± 1.08	138.22 138.38 (61.5)	134.14 138.46 (96.8)	0.79

3	K-M	3.76 ± 0.05	3.68 3.81 (78.0)	3.63 3.86 (97.0)	1.41
	K-AN	3.77 ± 0.05	3.72 4.22 (72.0)	3.67 4.27 (95.5)	1.28
	K-N	4.17 ± 0.05	4.12 4.22 (75.2)	4.07 4.27 (95.5)	1.24
4	Cl-M	94.23 ± 1.43	92.75 95.71 (66.7)	91.27 97.19 (97.9)	1.39
	Cl-AN	93.73± 1.13	93.60 94.84 (74.7)	92.47 95.99 (97.9)	1.63
	Ca-M	2.32 ± 0.05	2.29 2.37 (82.0)	2.22 2.42 (96.0)	1.96
5	Ca-AN	2.32 ± 0.04	2.28 2.36 (77.6)	2.24 2.40 (94.4)	1.79
	Ca-N	2.32 ± 0.04	2.29 2.37 (82.2)	2.22 2.42 (96.0)	1.9
6	CO2-M	10.51± 0.66	9.99 11.31 (73.6)	9.33 11.99 (92.0)	6.9
	CO2-AN	10.51± 0.72	9.79 11.43 (65.0)	9.07 11.95 (96.3)	6.85
	CO2-N	10.86 ± 0.60	10.26 11.46 (85.5)	9.66 12.06 (92.8)	5.5
7	GLU-M	4.45 ± 0.12	4.33 4.57 (75.7)	4.21 4.69 (98.8)	2.16
	GLU-AN	4.51 ± 0.14	4.37 4.65 (82.0)	4.23 4.79 (99.0)	3.14
	Glu-N	4.50 ± 0.12	4.38 4.62 (75.0)	4.26 4.74 (97.0)	3.51
8	Creat-M	94.1 ± 4.48	89.6 98.6 (72.0)	85.1 103.1 (93.0)	5.1
	Creat-AN	94.4 ± 4.36	90.0 98.8 (73.0)	86.6 102.2 (95.0)	5.06
	Creat -N	94.46 ± 3.67	90.8 98.2 (75.0)	87.1 101.9 (95.0)	4.5
9	Bili-M	116.2 ± 1.4	14.8 17.6 (73.7)	13.4 19.0 (95.0)	2.64
	Bili-AN	17.62± 1.32	16.30 18.94 (67.0)	14.98 20.26 (96.0)	7.4
	Bili-N	17.64± 1.41	16.23 19.05 (78.5)	14.82 20.46 (97.0)	7.9

M = Morning Shift AN = Afternoon Shift
N = Night Shift

DISCUSSION

Quality assessment and not just monitoring systems are also seeking attention g hormone assay. Diagnosis, treatment or prevention of disease gg on the provision of satisfactory and other countries as well

Almost all the results subject to errors arising within the laboratory between the receipt of the specimen and dispatch of report. Besides chemical or instrumental causes calculation errors and wrong specimen identification are also involved The main emphasis of quality control is on the monitoring of the performance characteristics of analytical methods. Such selection depends upon the reliability (accuracy, precision, specificity sensitivity, speed and cost.) of reagents and equipment, level of technical skill required safety & dependability. The performance of a method should be monitored at different concentrations, selected so as to cover the reference interval and perhaps suitable pathological levels. Control samples should be randomly inserted amongst patient's samples include the effects of carry over[1].

External quality control programmes i supplement the information derived from internal quality control [12]. They do not supplement the latter. Several schemes are in operation in various parts of the world and vary from large schemes involving many hundred laboratories to small local schemes.[14]

All results falling close to mean ±2 SD were accepted whereas those greater, upon rechecking revealed either transcription errors or sample insufficient for such analysis were not included. Replication analysis has been found of great help in solving such problems, by improving precision, identifying outliers and reducing errors due to carry over[1].

The purpose of the quality control program is to allow the operator to accept or reject individual results or batches of results according to predetermined criteria[15]. Although external quality assessment schemes have revolutionized laboratory performance in many parts of the world [16], yet they cannot complement or replace internal system.

Guidelines for some hormone assays have been published17. Results obtained from hormone immunoassay are well known to exhibit severe non- | uniformity of variance. The variance of replicate I measurements near the high concentration limit assay may be several hundred-fold greater than variance near the assay detection limit. This has lead to widespread use of imprecision profile plot[18] to provide sample graphical descriptions within assay, between assay or between laboratory imprecision H, function of concentration. Compton *et al.*, [19] first group to use imprecision profiles hi an immunoassay quality assessment.

REFERENCES

1. Rowan. R M. Laker. M. F. and Alberti. K. G. M. The Implicate of Assaying External Quality Control Sera Under “Special Conditions'* Ann. Clin. Biochem. 1984 21 64-8
2. Lim. H it and Zakiah. I. Quality Assurance and Malaysian National External Quality Assessment
3. Scheme for Clinical Chemistry Proceeding of XVI International Congress of Clinical Chemistry, UK, 1996
4. Sobki.S: Herry, G and Khan. S. Middle Last External Quality Assessment Scheme for Hormones Proceedings of XVI International Congress of Clinical Chemistry, UK. 1996.
5. Promptas. C: Prijavudhi.A A. and Pavaro, U. National Quality Assessment in Clinical Chemistry: A Thailand Experience Proceedings of XVI International Congress of Clinical Chemistry, UK. 1996.
6. Celorio. L.S.M. and Sanchez. P. A Two years
7. Experience Running a Computerized External Quality Programme in Cuba Province Proceedings of XVI International Congress of Clinical Chemistry, UK. 1996.
8. Gomo Z. A; Mujaj. W. BiMatarira. H.T. and Bullock, DG. The Zimbabwean External Quality Assessment Scheme. Proceeding of XVI International Congress of Clinical Chemistry, UK. 1996.
9. Penberthy.L A; Wyndahm, L.E. Designing Quality Assessment Programmes -Not Just a Monitoring System. Proceedings of XVI International Congress of Clinical Chemistry. UK. 1996.
10. Smith, I.; Findlay. F and (Cruickshank. A.M. The Quality Assurance Within the Clinical Chemistry Laboratory. Proceeding of ACB National Meeting. UK 1998
11. Hirst, AD. Extremal Quality Assurance. Ann. Clin. Biochem. 1998, 35 12-18.
12. Barnett. R>N; Me Iver. D.D and Gorton. W.L. The Medical Usefulness of Slat Tests. Am. J.C in Path 1978.69: 520-4
13. Watkinson. I. R. Fraser, C.G. Emergency Clinical Biochemistry Tests A. Survey and Discussion of Current Auster Practice. Clinical Biochemistry News. 1982,67.26-29.
14. Buttner. J. Broth. R. Boutwell, J H Broughton. P.M.G and Bowyer. R Provincial recommendations on quality Control Chemistry Part-5: External Quality Control Clin Chim. Acta. 1978, 83: 191-202.
15. Whitehead. T P. Browning, D. H Gregory. A.A Comparatively Survey of the Results of Analyses of Blood Scrum in the United Kingdom. J. Clin. Pathol. 1973.26: 435-45
16. Varley, H. Govenlock. A. H and Bell. M Practical Biochemistry, Vol: 1. 5th edition. Will Willum Heinemann Medical Books Ltd. London
17. Burin. J.M. Quality Assurance of Hormone Analyses. Ann. CIin Biochem. 1988,25. 340-45 Whitehead. T.P. Quality Control in Clinical Chemistry John Wiley and Sons, New York, 1977
18. Jeffcoate. S.L, Bncon. R.R and Beasrall, G.H. Assay Prolactin in UK- Recent Experience in UK External Quality Assessment Scheme Eksin, R P Basic Concepts in Quality Control in RIA and Related Procedures in Medicine. 1977. IAEA. 1978 6-20
19. Compton, P. Cole, B., Stuart, M. and Egan, G. The Evaluation of Impression in Collaborative Immunoassay Quality Assessment Programmes Ann Clin Biochem 1984.21:498-505.