Thesis Title Effect of Decimal Point on Quality Control Chart in Clinical Chemistry

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ABSTRACT

In order to clearly detection the analytical variation, quality control in clinical chemistry commonly present the control value on quality control chart. The pattern of quality control chart can be classified into 2 types; normal and abnormal. The abnormal pattern can be divided into 3 forms: out of control limit, trend, and shift.

By our study, we found the control chart of potassium, determined by the Beckman E4A Electrolyte Analyzer (Beckman Instruments, Inc., Brea USA), oftenly gave the constant values more than 5 days upper, on, or under the mean line; the shift like pattern. This pattern is the problem for analytical system evaluation. When the potassium values were read with 2 decimal points, the control chart did not give the constant values more than 5 days pattern.

The quality control charts of sodium, chloride, carbon dioxide, calcium, phosphate, glucose, bilirubin, and enzyme AST, ALT, and ALP also were studied. We found that control chart of bilirubin (mg/dL), carbon dioxide (mmol/L), calcium (mmol /L), and phosphate (mg/dL and mmol/L) gave the constant values more than 5 days pattern, too. When the calcium expressed as mg/ dL and bilirubin as umol/L were converted into mmol/L and mg/dL, respectively, we found that the converting results with one decimal point gave the constant values more than 5 days pattern; whereas the converting results with 2 decimal points did not give this pattern. When the control values of potassium, calcium, and phosphate expressed as mmol/L were read with 2 decimal points, and of carbon dioxide were read with 1 decimal point, all their control charts did not give the constant values more than 5 days pattern.

Therefore, the number of decimal point assigned for each chemical constituent has effect on the quality control chart pattern in clinical chemistry. The constant values more than 5 days pattern, or shift like pattern, which presented on the quality control chart can be corrected by suitable assigning the number of decimal point for each chemical constituent.