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Assessment of utility of daily patient results averages as adjunct quality control in a weekday-only satellite chemistry laboratory

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Assessment of utility of daily patient results averages as adjunct quality control in a weekday-only satellite chemistry laboratory

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ABSTRACT

Background: Our department operates a weekday-only (8AM-5PM) satellite laboratory in an infusion center with a menu of 18 chemistry tests on a Roche c501 analyzer. We examined whether daily patient results averages (PRA) in this setting might be useful as a patient-based quality control (PBQC) adjunct to standard daily liquid quality control (LQC) measurements. First, we evaluated the reproducibility (coefficient of variation, CV) of daily PRA for each analyte, and compared these to CVs of LQC. Second, for select analytes found to have relatively low PRA CVs, we evaluated the extent to which use of daily PRA measurements could improve detection of analytical errors when combined with LQC.

Methods: Patient results data for approximately one month (21 weekdays) were obtained from the Sunquest laboratory information system. For calculation of patient results averages (PRA), qualifying results were restricted to those within the reference range for each analyte. Coefficients of variation for PRA (CV-PRA) were compared to those observed for standard liquid quality control (LQC) measurements (CV-LQC). For those analytes for which CV-PRA was less than CV-LQC, we evaluated the potential advantage of addition of PRA to daily LQC. For each analyte, a presumed PRA shift was determined such that probability of detection (P) was 0.5 when using LQC alone (viz., using high LQC and low LQC measurements), according to criterion that at least one 1-2S deviation from mean was observed. For this same PRA shift, P = 0.5 for LQC alone was compared to P obtained for LQC + PRA (viz., using high LQC, low LQC, and PRA measurements), according to the same criterion.

Results: Across 21 days, the number of results per day per assay ranged from 23.64 (urate) to 71.42 (electrolytes). Qualifying results (results within the reference range) ranged from 70.6% (LDH) to 99.1% (Cr). Seven analytes had CV-PRA > CV-LQC (analyte, CV-LQC, CV-PRA): albumin, 1.25%; Ca, 0.67%; Cl, 0.62%; CO2, 1.13%; creatinine, 3.44%; K, 1.14%; Na, 0.65%. The remainder did not meet this criterion: ALP, 3.7%; ALT, 5.2%; AST, 5.1%; BUN, 4.6%; glucose, 1.4%; LDH, 2.0%; Mg, 1.4%; P, 2.5%; protein, 0.9%; TBL1, 6.1%; uric acid, 4.3%. The term "at least 1x- 1-2S" means that at least one 1-2S deviation from mean was obtained from among high LQC and low LQC measurements.

CONCLUSIONS

Daily PRA results across 21 days for 7 select analytes demonstrated CVs less than those for LQC: albumin, Ca, Cl, CO2, creatinine, K, Na.

For these analytes, calculations for presumed results shifts demonstrated that daily PRA can under some circumstances increase probability of detection of error when used as an adjunct to LQC. Daily PRA is an essentially cost-free form of PBQC that may be useful for certain analytes in part-time laboratory settings.

A shortcoming of the analysis is that we assumed a shift affecting all results within a day as a boundary case for calculations. This is an improbable although not unobserved scenario. At the very least, then, the analysis identified those analytes that in this setting would be most suitable as candidates for standard running-averages patient-based quality control [1].

Reference