AoD: Introduction

Over the last decade, regulators of in vitro diagnostic systems have been reducing the requirements for external quality control predicated on the analysis of laboratory data contained in large health system repositories. Based on today’s excessive daily patient repeated testing, we developed a highly specific average of deltas (AoD) that can verify the morning accuracy of hospital chemistry and hematologic analyzers. In addition, we have developed a calculus for transforming serial intrapatient results into a measure that we call PAAN: a combined measure of PreAnalytic variation including biologic variation as well as Analytical variation (PAAN). As preanalytical error is assumed to be sample-dependent, PAAN generally represents a mixture of biologic variation and analytic variation. As biologic variation of most laboratory tests is relatively constant, increases in PAAN can usually be attributed to increases in analytic variation and, occasionally, to preanalytic variation. Given today’s high repeat testing rates, PAAN can be determined for virtually all hospital analyzers and even for specific analytical periods.

Results: Based on general chemistry testing at Hitchcock, using AoD to demonstrate an analytical problem in a morning’s run, the number of repeated patient observations [N] follow: albumin (9), ALP (22), ALT (30), AST (25), HCO3 (14), sodium (22), calcium (22), glucose (22). We are now implementing AoD at Hitchcock Medical Center. With reference to PAAN, we have just validated the PAAN calculation for glucose determination by blood gas analyzers.

Conclusion: As reference sample quality control continues to be de-emphasized by the regulator and the laboratory industry, there is a growing need for serial patient data algorithms to fill the quality measurement and quality control vacuum.

AoD: Results and Conclusions

The AoD rapidly detected induced SE equal to control limits.

The best AoD was for total protein where an error equal to 0.75 g/dL was detected with ANPDD = 6.9 result pairs. The largest ANPDD in our study was for alanine aminotransferase where an error equal to 15 U/L was detected with an ANPDD of 31.6 result pairs.

The AoD detected SE more rapidly than our MA protocols. However one limitation of this comparison is that for the AoD we refer to the number of paired results, while the moving average represents consecutive results within the protocol inclusion limits. The AoD strategy relies on monitoring the average intra-individual difference of pairs of patient results collected within 20 - 28 hours of each other. This strategy will benefit institutions with a significant inpatient populations but has limited value for reference and outpatient laboratories. We are now implementing AoD at Hitchcock Medical Center.

PAAN: Introduction

We developed a calculus for transforming serial intrapatient results into a measure that we call PAAN™, a combined measure of PreAnalytic variation including biologic variation as well as Analytical variation (PAAN). As preanalytical error is assumed to be sample-dependent, PAAN generally represents a mixture of biologic variation and analytic variation. As biologic variation of most laboratory tests is relatively constant, increases in PAAN can usually be attributed to increases in analytic variation and, occasionally, to preanalytic variation. Given today’s high repeat testing rates, PAAN can be determined for virtually all hospital analyzers and even for specific analytical periods.

PAAN is calculated from serial intra-patient differences that can verify the morning accuracy of hospital chemistry and hematologic analyzers. In addition, we have developed a calculus for transforming serial intrapatient results into a measure that we call PAAN™: a combined measure of PreAnalytic variation including biologic variation as well as Analytical variation (PAAN). As preanalytical error is assumed to be sample-dependent, PAAN generally represents a mixture of biologic variation and analytic variation. As biologic variation of most laboratory tests is relatively constant, increases in PAAN can usually be attributed to increases in analytic variation and, occasionally, to preanalytic variation. Given today’s high repeat testing rates, PAAN can be determined for virtually all hospital analyzers and even for specific analytical periods.

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