pothyroidism without TAA, the TSH should be reevaluated after iodine restrictions, as was suggested by others (5). This may result in more acceptable and truer values for the normal range of TSH concentration.

References

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Erroneous Laboratory Results From Hemolyzed, Icteric, and Lipemic Specimens

To the Editor:

We previously reported the true concentrations of hemoglobin, bilirubin, and triglycerides in hemolyzed, icteric, and lipemic serum specimens submitted to our laboratory for analysis (1). Combining this information with interferographs (graphical displays showing the effects of interferents on each analyte measured with an instrument) for various analyzers (2) and the total number of requests for analyses measured in our laboratory allowed us to calculate the total number of erroneous results that would have resulted if each instrument had been in routine use in our department.

The following 38 analyzers were included in this study: Spectrum EPX, Vision, VP (Abbott Diagnostics, Abbott Park, IL); Parallel, Perspective (AM Diagnostics, Indianapolis, IN); Paramax (Baxter Health Care, Irvine, CA); Astra, Astra Ideal, Synchon CX5, Synchon CX5 (Beckman Instruments, Fullerton, CA); Hitachi 704, Hitachi 705, Hitachi 717, Hitachi 736, Hitachi 737, Reletox (Boehringer Mannheim, Indianapolis, IN); Express 550 (Ciba-Corning Diagnostics, Oberlin, OH); Dacos (Coulter Electronics, Hialeah, FL); acu III, Analyst, Dimension (DuPont Instruments, Wilmington, DE); Ektachem 700, Ektachem DT60 (Eastman Kodak, Rochester, NY); Genesis 21, Monarch, Multistat (Instrumentation Laboratory, Lexington, MA); Chem 1, Clinistat, DAX, RA-1000, Seralyzer, SMA 12, SMAC (Miles, Kankakee, IL); Nucleus (Nova Biomedical, Waltham, MA); AU5000, Demand (Olympus, Lake Success, NY); Mira (Roche Diagnostic Systems, Montclair, NJ); and CentrifChem (Union Caribde, Rye, NY).

Definitions and formulas for calculations were as follows:
- Total Erroneous Results (TER) for an instrument is the number of erroneous results that would have been reported during a year (1991) because of the presence of triglycerides, hemoglobin, or bilirubin in specimens submitted for analysis.
- Charges for Erroneous Results (CER) are the total charges made to patients for erroneous results caused by these potential interferents.
- Percentage of Workload (POW) is the percentage of the total chemistry workload that the analyzer being evaluated could have performed during the specific time interval.

We assumed that each analyzer would have been used whenever possible; that is, if glucose was part of an instrument's test menu, then all glucose analyses were performed with that analyzer. An erroneous result differed from the true result by >10%.

For each analyte \( i \) that could be measured with an analyzer, \( b_i, h_i, t_i \) are the % of specimens with concentrations of bilirubin, hemoglobin, or triglyceride, respectively, sufficiently large to cause a change of \( \pm 10\% \) in the result of test \( i \); \( R_i \) is the annual number of requests for test \( i \); \( C_i \) is the charge (in dollars) for test \( i \); \( T \) is the total annual number of tests performed in the chemistry laboratory; and \( n \) is the size of analyzer test menu (i.e., if an instrument could measure 12 different analytes, then \( n = 12 \)). Then:

\[
TER = \frac{\sum_{i=1}^{n} R_i (b_i + h_i + t_i) / 100}{T}
\]
Figure 1 also shows that all other possible combinations of results are possible. The least desirable combination, low POW and high TER and CER, is seen for such instruments as the Seralyzer, Cobas Mira, CentrifChem, and VP. Instruments such as the DAX, EPX, and Express 550 could perform a high percentage of our workload, but would have relatively large TER and CER. Other instruments such as the Clinistat, Analyst, and Nucleus would report relatively few erroneous results, but could not perform a large enough percentage of our workload to be useful in our setting. Analyzers in this group, however, may be appropriate in a stat or clinic laboratory, where a limited test menu would suffice.

We have previously shown that at least one method is available for each routinely measured analyte that is not influenced by hemoglobin, bilirubin, or triglycerides. Unfortunately, no single instrument has yet combined these interference-free methods. Until such an analyzer/reagent system is available, we believe that the calculations illustrated here should be undertaken before the serious consideration of any instrument.

References

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