QUALITY IMPROVEMENT IN SCREENING FOR CRITICAL CONGENITAL HEART DISEASE

Background: Unlike other newborn screening programs, screening for critical congenital heart disease (CCHD) with pulse oximetry requires human interpretation of a previously published algorithm, a feature that raises concerns about quality. We hypothesized that a) this method would be prone to error and b) a computer-based tool would lead to a more accurate interpretation of the screening results.

Methods: We performed a randomized crossover study at our institution in 2012 to compare the performance of a paper algorithm vs. a computer-based tool for interpretation of results from screening for CCHD with pulse oximetry. Each of the 102 participants was given 2 sets of 10 screening scenarios and was asked to interpret the results of each scenario as “Pass,” “Fail,” or “Retest.” Unknown to the participants, each set contained 4 “Pass” scenarios, 3 “Fail”, and 3 “Retest.” Healthcare providers with prior experience using pulse oximetry who would be likely to interpret results from such a screening program were eligible. Participants were randomized to use either the paper algorithm or computer-based tool for the first set of 10 scenarios and the alternative method for the second set. We used Wilcoxon rank sum tests to compare the accuracy of interpretation using the 2 methods.

Results: Overall, the subjects answered only 81.6% of the scenarios correctly when manually interpreting the algorithm. This result improved to 98.3% correct when using the computer-based tool (P<0.0001). These differences were most pronounced for the “Fail” scenarios (65.4% for the manual algorithm vs. 96.7% for the computer-based tool, P<0.0001) and the “Retest” scenarios (80.7% for the manual algorithm vs. 98.7% for the computer-based tool, P<0.0001), but were also significant for the “Pass” scenarios (94.1% for the manual algorithm vs. 99.0% for the computer-based tool, P=0.0002).

Conclusions: Use of a manual algorithm for the interpretation of results in screening for CCHD with pulse oximetry may be greatly susceptible to human error. Implementation of a computer-based tool to aid in the interpretation of the results is likely to lead to improved accuracy and quality of any pulse oximetry screening program.