

Abstract Title:

Standardization of the Methods Used for Umbilical Arterial Line Placement among VLBW Infants:

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Background: With multiple methods to determine the depth of initial insertion of umbilical arterial catheter (UAC) in sick very low birth weight (VLBW) infants, mal-positioning increases catheter-related complications, X-ray exposure, and handling with subsequent re-adjustments.

Objective(s): To determine whether using a single calculation formula versus multiple formulas for UAC placement is more accurate and cost effective.

Method: Firstly, we retrospectively reviewed data from January 2014 to June 2014 from VLBW infants who required UAC. It was determined that the formula proposed by Shukla (weight X3+9) was not only the preferred choice among 12 neonatal intensivists, but was also the one that required the least subsequent repositioning. Secondly, from July 2014 to June 2015, physicians were instructed to exclusively use the formula by Shukla prospectively. The catheter tip position on the initial radiograph was confirmed to be correct with placement between T6 and T9. To ensure compliance, the team, composed of three nurses and one physician, reminded other practitioners of the proposed practice standardization project. Data were analyzed using Fisher's exact test with Yates correction.

Results: Data collected retrospectively between January through June 2014 (n=22) was used as baseline. During this time, at least 4 different formulas were used to determine the depth of UAC

insertion for sick VLBW. Of these, 73% infants required at least one repositioning and at least two X-ray exposures compared to 48% ($p=0.051$) in the prospective group using exclusively the weight formula calculation by Shukla ($n=69$) reflecting a 25% reduction in adjustment and x-ray exposure rates. The current cost of x-ray in our hospital is \$399.00. Based on the sample size of this quality improvement project, the estimated cost savings was \$4,654.00 or 26% reduction in cost as a result of the improvement.

Conclusion: Standardizing the calculation method for the depth of umbilical artery catheter placement improved the accuracy of placement. A simple intervention, such as avoiding multiple formulas and choosing one universally accepted formula, has shown improvement nearing significance in accuracy, and demonstrable cost effectiveness.