Abstract:

Objectives: To evaluate if nurses can reliably perform ultrasound-guided peripheral intravenous catheter placement in children with a high success rate after an initial training period. A secondary aim was to analyze complication rates of ultrasound-guided peripheral intravenous catheters.

Methods: A database recorded all ultrasound-guided peripheral intravenous catheter encounters in the emergency department from November 2013 to April 2019 including the emergency department nurse attempting placement, number of attempts, and whether it was successful. Patient electronic medical records were reviewed for the time of and reason for intravenous removal. The probabilities of first-attempt successful intravenous placement and complication at successive encounters after an initial training period were calculated. These probabilities were plotted versus encounter number to graph best-fit logarithmic regressions.

Results: A total of 83 nurses completed a standardized training program in ultrasound-guided peripheral intravenous catheter placement including 10 supervised ultrasound-guided peripheral intravenous catheter placements. In total, 87% (3513/4053) of the ultrasound-guided peripheral intravenous catheter placed after the training program were successful on the first attempt. The probability of successfully placing an ultrasound-guided peripheral intravenous catheter increased as nurses had more experience placing ultrasound-guided peripheral intravenous catheters (R² = 0.18) and was 83% at 10 encounters. Twenty-five percent (904/3646) of ultrasound-guided peripheral intravenous catheters had complications, and there was no statistically significant relationship between the number of encounters per nurse and complication rates (R² < 0.001).

Conclusion: Nurses can reliably place ultrasound-guided peripheral intravenous catheters at a high success rate after an initial training period. First-attempt success rates were high and increased from 67% to 83% for the first 10 unsupervised encounters after training and remained high. The complication rate was low and did not change as nurses gained more experience.

Reference: