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Evaluation of the Feasibility of Focused Cardiac Training for Medical Residents in Ghana

Background: In the 1970s, the concept of the ultrasonic stethoscope emerged in the medical community. Since then the advances in technology have resulted in many compact handheld ultrasound machines with improved capabilities. These handheld echocardiogram machines improve portability for point of care cardiac imaging thus making it ideal for use and training in underserved and low resource settings. The aim of this study was to evaluate the feasibility of training medical residents in Ghana and to assess the learning curve achieved using a simplified theoretical and practical protocol for focused cardiac assessment.

Method: Theoretical and practical training sessions were conducted with two internal medical residents. The training was done at the Cape Coast Teaching Hospital and assessment included adequacy of images for interpretation, qualitative analyses of left ventricular (LV) and right ventricular (RV) function, and structure and evaluation of pericardial effusion. Each trainee performed 50 echocardiograms and interpreted 20 studies independently. Evaluations occurred at 6 weeks, 10 weeks and immediate post training on the competency of image interpretation compared with the corresponding interpretation of the trainer using the Kappa coefficient. Kappa of <0.00; 0.00 - 0.20; 0.21 - 0.40; 0.41 - 0.60; 0.61 - 0.80 and 0.81 - 1.00 indicating no agreement, poor, fair, moderate, substantial and almost perfect agreement respectively are reported.

Results: Forty participants, 72% males, were included in the analysis. LV structure demonstrated a moderate agreement in all stages of evaluation (kappa: 0.67, p=0.001; 0.64, p=0.002; 0.52, p=0.01). LV

function showed a concordance evolution from fair to moderate agreement (Kappa: 0.23, p=0.07; 0.55, p=0.03; 0.65, p=0.0040). RV structure showed a concordance evolution of fair to substantial agreement (Kappa: 0.22, p=0.05; 0.47, p=0.001; 0.71, p=0.001) with RV function showing a concordance evolution from poor to almost perfect agreement at the end of the evaluations (Kappa: 0.00; 0.41, p=0.04; 1.00, p<0.001). Pericardial effusion showed a concordance of moderate to perfect agreement (Kappa: 0.64, p=0.001; 1.00, p<0.001).

Conclusion: Focused cardiac assessment interpretation of LV and RV structure and function using handheld echo showed moderate to almost perfect agreement at the end of the training. The learning curve analysis demonstrates at least 10 weeks of training was effective for performing and analyzing focused images. The protocol used for this study could facilitate future design of focused cardiac imaging training in sub-Saharan Africa.