

**263 Combination of Brain Natriuretic Peptide and Automated Heart Sounds Improves Heart Failure Diagnostic Accuracy** *Sean P Collins, Christopher J Lindsell, W Frank Peacock, Virginia D Hedger, Alan B Storrow, University of Cincinnati: Cincinnati, OH, Cleveland Clinic Foundation: Cleveland, OH*

**Background:** Brain natriuretic peptide (BNP) has a high negative likelihood ratio for the diagnosis of heart failure (HF) but, at intermediate levels, it has a high false-positive rate. **Objective:** We hypothesized that the combination of an electronically detected S3 with BNP improves diagnostic accuracy in emergency department (ED) patients with possible heart failure. **Methods:** Automated heart sound results (Audicor, Inovise Medical, Inc.), BNP levels, and final hospital discharge diagnosis were prospectively collected in a convenience sample of dyspneic ED patients. Predicted probabilities from a logistic regression model were used to generate a receiver-operating characteristic (ROC) curve for the detection of primary discharge diagnosis of heart failure using a combination of BNP, stratified at 100 pg/mL and 500 pg/mL, and the detection of an S3. In this manner, 6 patient groups are created based on BNP level and the presence or absence of an S3. Likelihood ratios (LRs) were calculated from the slopes of the ROC curve for each group. **Results:** There were 439 eligible subjects; 190 were excluded (17 pilot patients, 36 without S3 data, 41 without a primary HF diagnosis, and 96 with no BNP). Mean age of the 249 remaining patients was 63.7 years; 47% were white, 54% were female, and the mean BNP level was 739 pg/mL. Both BNP and an S3 were significant predictors of HF ( $p < 0.001$ ,  $p = 0.024$ , respectively). Subjects with BNP  $< 100$  pg/mL had a negative LR of 58, which was unchanged by the addition of an S3. Those patients with a BNP between 100 and 500 pg/mL and no S3 had a positive LR of 0.8, which was increased to 2.0 with the addition of an S3. Patients with a BNP  $> 500$  pg/mL and no S3 had a positive LR of 4.2, which increased to 12.8 with the addition of an S3. **Conclusions:** The combination of BNP and the S3 heart sound can improve diagnostic accuracy in ED patients with suspected heart failure, particularly when BNP is within the intermediate range.

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