Paul Collinson (Professor of Cardiovascular Biomarkers, St George's University of London).

David Gaze (Clinical Research Scientist, St George's Hospital, London

Steve Goodacre (Professor of Emergency Medicine, Health Services Research, University of Sheffield).

Evaluation of the European Society of Cardiology recommended rapid diagnostic algorithms in a challenging low risk cohort.

Objectives: To examine diagnostic efficiency of the proposed European Society of Cardiology rapid diagnostic algorithms in a challenging low risk cohort.

Methods: Samples analysed were from the point of care arm of the RATPAC trial (Randomised Assessment of Treatment using Panel Assay of Cardiac markers), set in the emergency departments of six hospitals. Prospective admissions with chest pain and a non-diagnostic electrocardiogram were randomised to point of care assessment or conventional management. Blood samples were taken on admission and 90 minutes from admission. Patients were admitted if the initial of 90 minute sample exceeded the 99th percentile for cardiac troponin I (cTnI) analysed using the Stratus CS (CS) (Siemens Healthcare Diagnostics), range 30-50,000 ng/L 10% CV 60ng/L 99th percentile 70 ng/L. An additional blood sample was taken at admission and 90 minutes from admission, separated and the serum stored frozen until subsequent analysis for cTnI by using the Architect hs cTnI (Abbott Diagnostics), range 1.1-50,000 ng/L 10% CV 4.7ng/L and high sensitivity cardiac troponin T (hs cTnT) by the Roche high sensitivity cardiac troponin T assay hs-cTnT (Elecsys 2010, Roche diagnostics), range 3 - 10,000ng/L, 10% CV 13ng/L, 99th percentile 14 ng/L.

The universal definition of myocardial infarction (MI) utilising laboratory measurements of cardiac troponin performed at the participating sites together with measurements performed in a core laboratory was used for diagnosis. Myocardial infarction was diagnosed by the combination of a delta troponin plus a value exceeding the 99th percentile. The two proposed algorithms for ruling out and ruling in MI were then applied to the admission and serial samples to directly compare diagnostic efficiency of the two analytes.

Results: 276 patient samples were available (169 male, median age 54.5 years, range 23.7-90.6) with 165 serial samples. The incidence of MI was 276 (9.4%). A single measurement on admission excluded MI in 174/276 (63%) for hs cTnI with no missed cases, negative predictive value (NPV) 100% and in 219/276 (79.3%) for hs cTnT with 2 missed cases, NPV 99.1%. Serial sampling excluded 128/165 (77.6%) for hs cTnI with no missed cases, NPV 100% and 149/165 (90.3%) for hs cTnT with 1 missed case, NPV 99.3%. 27/165 (16.4%) were classed as indeterminate for hs cTnI and 8/165 (4.8%) for hs cTnT. Rule in sensitivity for hs cTnI was 100% (5/5) at 96.9% specificity with no indeterminate cases. For hs cTnT rule in sensitivity was 40% (2/5) at 96.3% specificity with 2 intermediate cases.

Conclusion: Both single measurement and serial measurement algorithms proved excellent rule out tools but the rule in algorithm was less reliable in this patient group. This probably reflects the difficulty of diagnoses in low risk patients with relatively small troponin changes.