

ABSTRACTS OF SOCIETIES

Scottish Society of Physicians

Meeting held in October 2006

A Point-of-Care Assay Allows Rapid and Accurate Assessment of Platelet Inhibition by Clopidogrel.

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Introduction: Individual variation in platelet inhibition by clopidogrel has recently emerged and an association between poor inhibition and increased cardiovascular risk has been demonstrated. There is no gold standard method for the assessment of clopidogrel response but flow cytometric measurement of intraplatelet vasodilator stimulated phosphoprotein phosphorylation (VASP-P) directly reflects platelet response to ADP through the P2Y₁₂ receptor, the target for clopidogrel. We sought to compare the results of this assay and a novel aggregation based point-of-care assay (VerifyNow P2Y₁₂ (Accumetrics, US)) in patients undergoing percutaneous coronary intervention (PCI). **Methods:** We tested 62 patients immediately prior to coronary intervention. All patients had been loaded with clopidogrel 600mg followed by 75mgs/day. All patients were taking aspirin 75mg/day and were on no other antithrombotic or anticoagulant therapy. Blood samples were collected in 3.2% sodium citrate tubes using a butterfly and vacutainer technique in the ante-cubital fossa. **Results:** VASP-P derived platelet reactivity index (PRI) demonstrated a wide range of inhibition by clopidogrel (mean PRI 52.9, SD 21.7, range 3.8-92.6). Similar variability was seen using the VerifyNow P2Y₁₂ assay (Mean % inhibition 49.2, SD 28.0, Range 1-97). Correlation between the two assays was good (r = -0.65). **Conclusion:** There is a wide variation in platelet inhibition by clopidogrel assessed by VASP-P and the point-of-care assay, VerifyNow P2Y₁₂. Further studies are required to evaluate whether these results predict clinical outcome. If so, point-of-care assays may permit the routine assessment of patients in clinical practice to guide therapeutic dosing and reduce the risk of cardiovascular events.

High Dose Allopurinol Dramatically Improves Endothelial Function and Abolishes the Vitamin-C Sensitive Component of Oxidative Stress in Chronic Heart Failure

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Introduction: Chronic Heart Failure (CHF) is a condition that causes substantial morbidity and mortality. Patients with CHF have marked endothelial dysfunction. **Methods:** Thirty patients with stable New York Heart Association (NYHA) Class II-III CHF were studied in a randomised, placebo-controlled, double blind,

crossover design. After each 4 week treatment period, endothelial function by was assessed forearm venous occlusion plethysmography. **Results:** Allopurinol had the expected effect on plasma uric acid. There was no significant difference in biochemical parameters between all three treatment periods. There was a 59% improvement in FBF between placebo and 300mg allopurinol and a further 52% improvement in FBF between 300mg allopurinol and 600mg allopurinol (143% improvement between placebo and 600mg allopurinol). This improvement was maintained when the data from the non-infused arm is not used (p<0.001). The benefits of vitamin-C co-infusion, used as a free radical scavenger, were reduced with increasing doses of allopurinol and was indeed obliterated by high dose allopurinol. (For tables see www.smj.org.uk) **Conclusions:** We have shown for the first time in man, *in-vivo*, that high dose allopurinol is an effective antioxidant capable of abolishing the vitamin C-sensitive component of oxidative stress. We have shown that high-dose (600mg/day) allopurinol improves endothelial function by a much larger margin (using estimated marginal means: 143% increase compared to placebo) than has been seen by many other treatments. These results suggests that virtually all of the literature on allopurinol have used suboptimal doses and future studies on allopurinol should consider using 600mg/day dose so that we can fully harness the therapeutic potential of this treatment.

MRSA: Lack of Effectiveness of Infection Control and Eradication Policy

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Introduction: Methicillin Resistant Staphylococcus Aureus (MRSA) is responsible for the largest outbreak of hospital acquired infection to date. A policy of screening of all patients on admission to an orthogeriatric unit, devised in consultation with Infection Control Services, was introduced and a protocol for the eradication of MRSA in MRSA positive patients implemented. The aim of the study was to determine the effectiveness of this policy. **Methods:** 300 consecutive discharges were identified and data collected from their case notes. **Results:** Of the 300 consecutive admissions, 92% were screened for MRSA, 19.2% of which were found to be MRSA positive on at least one swab during their admission. Of the MRSA positive cases, in 30.1% the MRSA was considered the cause of active infection. 11.3% of those patients acquired MRSA in the wards, while the rest were found positive in their first screen, usually taken on the first or second day of transfer to the wards. Eradication treatment was administered to 90.4% and the protocol fully implemented in 78.8%. Despite this the final screening test was positive for MRSA in 73.1% of the patients. **Conclusion:** MRSA is highly prevalent, with 19% of patients in our unit found to have positive swabs, and a cause of active infection in 30.1% of these. Despite the good adherence to MRSA eradication and isolation protocols, MRSA remained prevalent and resulted in new cases of colonisation in this orthogeriatric unit, indicating lack of effectiveness of the standard infection control MRSA eradication policy.

Protocol Design and Audit of Investigation of Suspected Non-Massive Pulmonary Embolism, Aberdeen Royal Infirmary

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Background: Pulmonary embolism (PE) is a major health problem with an estimated incidence of 60-70 cases per 100,000 and an untreated mortality estimated at 25-30%. The short-term outcome of patients is greatly influenced by appropriate institution of anticoagulant therapy. Once treatment is started, death from PE is rare. Appropriate management is determined by timely diagnosis. The British Thoracic Society guidelines suggest all patients with suspected PE have their clinical probability assessed and documented. This encourages good clinical assessment, allows better interpretation of isotope scans, and in combination with D-dimer testing can substantially reduce the need for imaging. **Aim:** To assess current approach to investigation of suspected non-massive PE in the acute medical admissions unit (AMAU). **Method:** The notes of 50 patients were reviewed to assess documentation of clinical probability, and use of D-dimer and imaging. **Results:** Revealed poor documentation of clinical probability, misunderstanding of the role of D-dimer and widespread belief that low probability V/Q scans exclude PE. Only 14% of patients had clinical probability documented and 54% of D-dimers requests were deemed inappropriate. Where negative D-dimer had excluded DVT in low risk patients, 43% still went on to V/Q scan. In 1 high risk patient negative D-dimer was wrongly used to exclude PE. **Conclusion:** A new protocol was designed involving clinical probability scoring and documentation, D-dimer testing and use of appropriate imaging.

The Prevalence of Left Ventricular Hypertrophy in Stable Treated Angina Pectoris Patients.

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Background: The prognosis of patients with coronary artery disease (CAD) is dependent on many factors. A potentially reversible factor leading to cardiac death in CAD patients is left ventricular hypertrophy (LVH). However, LVH will only have a large impact overall in CAD if it is common. Therefore we aimed to assess the prevalence of LVH in patients with stable, treated angina and its relationship with BP. **Methods:** 351 consecutive patients with angiographically confirmed coronary artery disease were recruited. Echocardiographic LV mass was performed and correlated with both office and 24 hour ambulatory blood pressure. **Results:** Of the 267 patients with LV mass measurements, 133 (50%) had LVH. The mean 24 hour ambulatory blood pressure reading was systolic 125 +/- 12 mmHg and diastolic 68 +/- 8 mmHg in the LVH group. Sixty one percent of LVH patients had a normal 24 hour blood pressure reading. **Conclusions:** We conclude that echo LVH is common in patients with stable treated angina and the majority of these patients had a normal BP at the time of study. As LVH regression has proven beneficial independent of BP reduction, identifying and vigorously treating LVH in CAD may represent an important new opportunity to reduce the risk of premature death in these patients.

Evaluation of the Diagnostic Utility of Additional Electrocardiograph Recordings with Respect to Cardiac Troponin I Levels in Patients Presenting with Chest Pain with Normal 12-lead Electrocardiograph Recordings.

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Background: Little information is currently available about the diagnostic utility of electrocardiograph (ECG) signals recorded from non-standard chest positions in relation to the prediction of myocardial injury as defined by cardiac troponin I (cTnI) release. The purpose of the study was to assess the potential use of additional ECG leads for predicting subsequent serum troponin positivity in patients with nondiagnostic 12-lead ECG recordings. **Methods:** Sixty-one patients presenting with cardiac-like chest pain of onset less than 24 hours and nondiagnostic admission 12-lead ECG findings had ten additional recordings performed (right-sided leads V3R-V6R, high lateral leads V1H-V3H, and posterior leads V7-V9). Associations between T wave abnormalities and ST segment shift in these leads with serum cTnI concentration were assessed using contingency table analysis. **Results:** Significant relationships were found between serum cTnI concentrations and T wave abnormalities in the right-sided leads (V3R: $\chi^2=7.677$, $p=0.012$; V4R: $\chi^2=4.939$, $p=0.055$; V5R: $\chi^2=5.663$, $p=0.030$; V6R: $\chi^2=1.683$, $p=0.332$). Similar significant findings were also found between cTnI and T waves in the posterior leads (V7: $\chi^2=5.535$, $p=0.029$; V8: $\chi^2=5.113$, $p=0.038$; V9: $\chi^2=0.903$, $p=0.479$). A significant association was found between cTnI concentration and ST segment abnormality in lead V3H ($\chi^2=7.525$, $p=0.018$). No other significant associations were found between ST segment features and serum cTnI positivity. **Conclusion:** The use of right-sided and posterior leads provides helpful diagnostic information in the assessment of chest pain patients with nondiagnostic admission 12-lead ECG findings. Further evaluation of additional leads in the screening of these patients is warranted.

Adopting the American College of Cardiology Guidelines for the Assessment of Acute Coronary Syndrome Patients may Reduce Hospital Admissions for Cardiac Chest Pain by up to 30%.

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Background: The American Heart Association/American College of Cardiology (AHA/ACC) guidelines suggest that a troponin >12hrs following the onset of symptoms is sufficient to assess chest pain patients. European Society of Cardiology guidelines emphasise that myocardial enzymes should be checked >12 hrs following resolution of chest pain symptoms. We analysed how many patients could potentially have avoided admission according to the AHA/ACC criteria. **Methods:** We prospectively audited all patients admitted to the acute medical receiving unit in our hospital over a 4-week period with suspected cardiac chest pain. Duration of chest pain, time of hospital admission, length of hospital stay and final diagnosis on discharge were recorded. **Results:** Complete data (including symptom onset) was available on 115 patients.

The distribution of patients according to the duration of their symptoms prior to A&E attendance is shown in Figure 1 (see www.smj.org.uk). Chest pain symptoms had started more than 12 hours previously in 42 patients (37%). Of these patients, only 8 had a final diagnosis of acute coronary syndrome. Length of hospital stay was also recorded for all 115 patients, showing no significant difference between groups. **Conclusion:** Forty-two patients (37%) admitted with suspected cardiac chest pain had symptoms for more than 12 hours prior to A&E attendance. Thirty-four of these patients (30%) were deemed not to have an acute coronary syndrome and may have been eligible for immediate discharge according to the AHA/ACC guidelines. Adopting the AHA/ACC guidelines could have significant potential savings for acute receiving units.

Are Post-Mortems in Cancer Patients Useful?

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Background: The use of post-mortem examinations (PMs) has recently faced public controversy. The number of PMs requested has declined. Scottish standards for PMs have been established and audited.¹ **Aims:** To examine the value of PMs in patients with cancer and to review feedback of findings to family. **Methods:** Review of pathology reports and clinical notes of all patients undergoing PMs as requested by a consultant cancer physician between 1998 and 2005. **Results:** Reports of 54 of the total 56 PMs were reviewed. Cause of death was different to the presumed cause in 21 cases (39%). Important new diagnoses were made in 46 cases (85%). There were delays in issuing the results of PMs in 91% of cases. These failed to meet the 21 day target for reports. Many patients had lung cancer and despite a high index of suspicion, pulmonary emboli were identified only at PM in 6 patients. Sixteen of the 20 relatives asked (80%) gave specific permission for retention of tissues. All relatives were offered consultant feedback on the results and 7% took up this offer. **Conclusions:** PMs continue to provide a high educational return, identifying new and more accurate diagnoses. There is a delay in obtaining reports, which may be of detriment to educational value and delays feedback to the bereaved relatives. Interestingly, diagnostic accuracy of PE in patients with cancer is low. PMs are being performed with the full consent of relatives.

For references, see www.smj.org.uk

Treatment Delays in the Referral of Patients with ST Segment Elevation Myocardial Infarction (STEMI) for Emergency PCI.

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Background: Indications for emergency percutaneous coronary interventions for patients presenting with STEMI in the West of Scotland were established in March 2005. Primary PCI was recommended for patients with a contraindication to thrombolysis or cardiogenic shock or patients presenting more

than 6 hours after onset of symptoms. Patients with failed reperfusion should be referred for consideration of rescue PCI rather than further thrombolysis. **Methods:** From September 2005 to March 2006, 158 patients with STEMI were transferred for emergency PCI to the Western and Royal Infirmary, Glasgow. One hundred and sixteen patients were male and 42 female. The age range was 32-84 years (mean 60). **Results:** The site of STEMI was 56.3% inferior/posterior, 43.0% anterior and 0.6% Left Bundle Branch Block (LBBB). The majority of patients were referred for rescue PCI (71.5%). One hundred and sixteen patients went directly to the cath lab and 101 had PCI. Treatment delays are summarised below (for table refer to www.smj.org.uk). **Conclusions:** Significant delays were identified in determining the need for emergency PCI and in subsequently transporting patients to and within the PCI sites. These delays potentially compromise outcomes and could be minimised if all patients with STEMI were triaged directly to PCI centres.

Troponin I in Acute Heart Failure- a Helpful Test?

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Background: In their 2005 guidelines, the European Society of Cardiology recommends that cardiac enzymes are checked routinely in all patients admitted to hospital with acute heart failure (AHF). We sought to analyse Troponin I (TnI) levels of patients admitted to our centre with AHF. **Method:** We prospectively audited 50 consecutive admissions to our Acute Medical Unit with a diagnosis of AHF. All patients had dyspnoea as their primary complaint and had clinical \pm radiological evidence of pulmonary oedema. Patients reporting chest pain were excluded. **Results:** The precipitant of AHF was thought to be ischaemic (based on ECG changes \pm TnI level) in 16% of admissions. The remainder were attributed to atrial fibrillation (22%), infection (10%) and drugs (14%). No precipitant was identified in 38%. TnI assays (normal < 0.04pg/ml) were performed in 92% of patients at least 12 hours after arrival in hospital. Detectable levels were found in 76% of cases and were raised in the majority of cases regardless of the precipitant (Table 1, see www.smj.org.uk). Those patients with left ventricular systolic dysfunction (LVSD) or ischaemic heart disease (IHD) had higher rates of detectable TnI levels, but not significantly so. [LVSD(84%) v no LVSD(63%), $p=ns$; IHD(81%) v no IHD(72%), $p=ns$] Patients with a negative TnI result were significantly less likely to receive cardiology input during their stay compared to those with detectable levels (18% v 68% respectively, $p<0.01$). **Conclusion:** TnI levels are detectable in the majority of AHF admissions (without chest pain) regardless of the precipitating insult and does not help to identify those patients with LVSD or IHD. Despite this, TnI results may influence which patients receive cardiology input during their stay. The routine checking of cardiac enzymes after AHF in is of questionable benefit. We suggest that they only be checked in cases where acute coronary syndrome is suspected clinically.

Investigations and Treatment of Acute Heart Failure in a Typical Scottish Hospital. Do We Follow the Guidelines?

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Background: The European Society of Cardiology (ESC) published guidelines for the treatment and management of patients with acute heart failure (AHF) in 2005. We sought to assess how our centre, a busy city teaching hospital, compared with these guidelines. **Method:** We prospectively audited 50 consecutive admissions to our Acute Medical Unit with a diagnosis of AHF. All patients had dyspnoea as their primary complaint and had clinical \pm radiological features of fluid overload. Patients reporting chest pain were excluded from the study. **Results:** The mean age of the study population was 76.9 years; 60% were female. Women were significantly older than men (80.3yrs v 71.8yrs, $p=0.001$). **Treatment:** Based on ESC guidelines, diuretics and opiates were indicated in all of our patients- only 6% received opiates. 100% received diuretic therapy (intravenously in 84%, which the ESC states is the preferred route). Nitrates were indicated in 86% of our patients, although only 22% of patients received this.

Investigations: The following laboratory tests should be performed in all AHF admissions, according to ESC guidelines: (i) full blood count, (ii) urea and electrolytes, (iii) glucose, (iv) C-reactive protein, (v) cardiac enzymes, (vi) D-dimer. In our study, these tests were performed in (i) 100%, (ii) 100%, (iii) 98%, (iv) 92%, (v) 92% and (vi) 12% of patients respectively. **In-patient care:** The ESC recommends specialist cardiology input for all AHF admissions. The subsequent care of AHF admissions in our study are shown in Table 1 (see www.smj.org.uk). **Conclusion:** In our centre, treatment for AHF appears to concentrate on diuretic therapy whilst opiates and nitrates are underutilised. Almost half of all AHF admissions received no cardiology input during their stay, with elderly patients more likely not to receive this. With an aging population, it is perhaps unfeasible for all AHF admissions to receive specialist cardiology care. In the future, there may be a role for Care of the Elderly physicians with a special interest in cardiology.

Metformin: too much of a Good Thing?

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Background: The United Kingdom Prospective Diabetes Study proved that metformin (MF) reduces macrovascular disease and mortality in Type 2 diabetes (T2DM). Appropriately, MF is increasingly being prescribed. We have recently seen 3 cases of metformin-induced lactic acidosis (MLA) (one fatal). The introduction of estimated glomerular filtration rate (eGFR) has emphasised the insensitivity of creatinine as a filtration measure. The BNF recommends stopping MF when the GFR is <50 ml/min. We wished to review our prescribing habits of MF in relation to eGFR and macrovascular disease. **Method:** We performed a retrospective analysis of 194 T2DM on MF attending the outpatient clinic between January and May 2006. **Results:** Twenty-one patients (11%) had an eGFR <50 ml/min, with 4 patients (2%) having an eGFR <40 ml/min. No patients on MF had an eGFR below 30 ml/min. Of the patients with an eGFR <50 ml/min, 33% have had an acute myocardial infarction, 24% a stroke and 38% have peripheral vascular

disease. 57% have microvascular complications. The majority are on aspirin (71%), an ACE inhibitor (81%) and a statin (86%). Acute illness resulting in acute renal failure was the cause of MLA in 2 of our cases. Their pre-morbid eGFRs were 49 and 53 ml/min. **Conclusion:** These data suggest that MF is being used in appropriate individuals. The risk of MLA is likely to increase and we therefore suggest that patients on MF should withhold treatment during intercurrent illness. More research is required to ascertain the ideal eGFR at which to discontinue MF, taking into account its macrovascular benefits.

Does an Integrated Care Pathway Enhance the Management of Diabetic Ketoacidosis?

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Introduction: Integrated care pathways (ICPs) are management plans that indicate the sequence and timing of the optimal treatment for individuals with a given disorder. The treatment of diabetic ketoacidosis (DKA) before and after the implementation of an ICP in a teaching hospital was examined. **Methods:** Twenty-seven episodes of DKA were identified during the 13 month control period and 22 in the 13 months following implementation of the ICP. Case notes were reviewed and relevant clinical data extracted. **Results:** The introduction of the ICP was associated with a reduction in the time taken to initiate intravenous fluid, (67.7 ± 58.6 min to 30.9 ± 33.8 min; $p=0.008$). Time taken to initiate insulin infusion was also reduced, (101.0 ± 143.2 min to 50.2 ± 43.6 min; $p = 0.016$). The proportion of patients commenced on IV insulin within the 60min increased from 48% to 77%; ($p = 0.039$). In addition, there was a reduction in the prescription of antibiotics (48% to 18%; $p = 0.028$) and low molecular weight heparin (59% to 5%; $p = 0.000$). Length of stay was not affected. **Conclusions:** Good practice would dictate that the reduction in time to initiation of fluid and insulin therapy of dehydrated acidotic patients is a positive clinical finding. In addition, it appears that by compelling doctors to consider the indication for antibiotics and heparin that the ICP significantly reduced overmedication of patients. The ICP significantly improved key areas in the management of DKA, although there remains room for further improvements.