O148  THE RELATIONSHIP BETWEEN INTENSIVE CARE UNIT LENGTH OF STAY AND LONG TERM MORALITY IN SURGICAL ADMISSIONS

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Introduction: There is a paucity of data describing the association between ICU LOS and mortality in surgical patients, particularly long term. We aimed to explore this relationship in a large cohort of surgical post-operative admissions. We also sought to stratify these parameters by surgical specialty and procedure type which has yet to be described.

Method: A retrospective observational cohort study of adult surgical admissions to the ICU of a large academic tertiary medical centre. We utilised the primary end points of, post-operative ICU LOS, in-hospital and ICU mortality, and mortality at 28 days, one year and two years.

Result: 6,203 patients across twelve specialties were admitted during the eight year study period. For ICU and in-hospital mortality, the median LOS in days for survivors was 2.2 (IQR: 1.2-4.9) and that of non-survivors, was 3.2 (IQR: 1.5-7.9). At 28 days, one year, and two years, the respective values were, 2.2 and 3.3; 2.1 and 3.1; 2.1 and 3.0 (all p<0.0001). The greatest median LOS and two year mortality was found with neurosurgery and cardiothoracic surgery; 3.3 days (IQR: 1.7-9.5), 27.9%, and 3.1 days (IQR: 1.5-8.0), 35% respectively. These values were greatest for ventriculostomy procedures; 10.6 days (IQR: 4.8-18.2), 40.8%.

Conclusion: There is a significant association between post-operative ICU LOS and mortality that persists for at least two years. Our results may provide a more objective basis for clinical decisions, the use of limited resources, and inform on appropriate treatment expectations. ICU: intensive care unit, LOS: length of stay, IQR: interquartile range

Take-home message: There appears to be an association between post-operative intensive care unit length of stay and long term mortality.

O149  2% TOPICAL GLYCOPYRROLATE SPRAY REDUCES AXILLARY HYPERHIDROSIS TO A SIMILAR EXTENT AS BOTOX INJECTIONS

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Introduction: Axillary hyperhidrosis affects 3% of the population. Although topical anticholinergic solutions have been used in its management, their effectiveness compared with the "gold standard" Botox injections is unclear. This study compares the effect on hyperhidrosis of different concentrations of topically applied glycopyrrolate spray with Botox injections.

Method: Of 40 patients with axillary hyperhidrosis (8male, mean age 30 years range 20-41 years), 10 were allocated to each four groups: a) 1% glycopyrrolate spray bd; b) 2% glycopyrrolate spray bd; c) subcutaneous botox injections, d) no treatment. The effect of interventions were determined by comparing before and 6 weeks post treatment commencement, assessments of hyperhidrosis (Hyperhidrosis Disease Severity Scale, HDSS); psychological precipitating factors and physical effect of hyperhidrosis. These scores were also compared with those of 40 people without axillary hyperhidrosis.

Result: For the three treatment groups, hyperhidrosis was significantly improved (p<0.05) when compared with pre-treatment HDSS scores. The degree of improvement was less for the 1% glycopyrrolate group when compared with the Botox group (p<0.05), but there was no difference between the effect of 2% glycopyrrolate and Botox. No treatment group reduced the hyperhidrosis to a level similar to those without hyperhidrosis. For the 2% glycopyrrolate and Botox groups there was a significant and equivalent improvement in the influence of psychological precipitating factors such as public speaking or being in a closed environment, as well as axillary hyperhidrosis specific physical effects.

Conclusion: 2% (but not 1%) topical glycopyrrolate spray relieves axillary hyperhidrosis to a similar extent as Botox injections.

Take-home message: Topical glycopyrrolate spray reduces axillary hyperhidrosis to a similar extent as Botox injections.
O150 LOOKS CAN BE DECEIVING: IS THERE VALUE IN COGNITIVE ASSESSMENT OF COMPLEX SURGICAL SKILLS?
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Introduction: The Prefrontal cortex (PFC) responsible for attention processing supports early motor-learning when attention to the task is high and sensory feedback dependent. Practice leads to dynamic adaptations in brain activity (neuroplasticity) captured by reduced PFC engagement on functional-neuroimaging. We aim to investigate expertise and practice dependent disparity in PFC activation linked to the acquisition of a complex laparoscopic skill.

Method: The first cohort experts (n=9), residents (n=11), and novices (n=12) were assessed during performances of laparoscopic suturing and knot-tying in a box trainer. A second cohort of novices (n=12) were trained in the same task for eight hours each, spread over seven sessions in a fortnight. Assessments, akin to the first cohort were undertaken at the start, middle and end of their training regime. Technical performance was assessed using the Fundamentals of Laparoscopic Surgery (FLS) curriculum. Optical-Topography assessed brain-activation by monitoring task-evoked changes in cerebral oxygenated-haemoglobin from 44 regions in the frontal lobe, of which 22 were located in the PFC.

Result: Technical performance significantly improved with expertise (median scores±IQR: novices=316±74, trainees=392±80, experts=488±36, Kruskall-Wallis p<0.001) and training (median scores±IQR: Baseline=302±128, mid-assessment=421±86, final-assessment=471±40, Friedmans p<0.001). Consistent with motor-learning literature, greater PFC oxygenation was observed amongst novices and trainees in comparison to experts (Kruskall-Wallis p<0.001). However training failed to delineate a significant reduction in PFC oxygenation (Random Effects Model p=0.065).

Conclusion: Experts, less reliant on the PFC portray automaticity. Caution should be taken in credentialization based on hand performance alone as it does not accompany neuroplastic refinements heralding expertise development.

Take-home message:
Refinements in hand performance of complex laparoscopic skills do not simultaneously accompany a reduction in reliance on attention to support performance. Functional neuroimaging serves as a potential adjunct in assessment of complex laparoscopic skills.

O151 FDG-AVID NODAL STAGE OF OESOPHAGEAL CANCER AND RESPONSE TO NEOADJUVANT CHEMOTHERAPY: NEW CLASSIFICATIONS PREDICTING DISEASE PROGRESSION BEFORE SURGERY, AND EARLY RECURRENCE AFTERWARDS
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Introduction: Progression of oesophageal cancer during neoadjuvant chemotherapy (NAC) is common yet unpredictable. We previously demonstrated an impassable tumour, FDG-avidity, and the presence of FDG-avid nodes before and after NAC to predict progression. In this study we define and quantify FDG-avid nodal stage and response for the first time, and assess their predictive utility.

Method: All patients with oesophageal cancer stage before NAC by PET-CT were identified (2006-2014). Factors were identified using multivariate binary logistic regression. Models were generated and validated using logistic regression (LR), decision tree analysis (DTA) and artificial neural networks (ANN).

Result: Metastases after NAC were detected in 20/383 patients (5.22%). Avid nodal stage was quantified as avidN0, avidN1 (1-2 nodes) and avidN2 (>2 nodes). AvidN stage before NAC predicted progression, independent of traditional N stage; patients with non-avid ≥N1 disease had no greater risk than N0 disease. Unsuspected unresectable disease was found at surgery in 26/248 (10.5%) patients re-staged with PET-CT. This was independently associated with avidN stage. AvidN response was quantified as a composite of avidN stage and nodal SUVmax; stable/progressive disease independently predicted unresectable disease. LR and DTA models were highly sensitive and specific for both endpoints. Patients identified as high-risk for unresectable disease by DTA (lack of complete avid nodal response, or impassable tumour) but undergoing successful resection, had a higher probability of 1-year recurrence (35.4-v-17.8%; p=0.012). Discussion Novel definitions of avid nodal stage and response predict disease progression and early recurrence. They identify high-risk patients, for additional re-staging and counselling.
Take-home message:
Novel definitions of FDG-avid nodal stage and metabolic response to neoadjuvant chemotherapy predict oesophageal cancer progression and early recurrence. They identify high-risk patients, for additional re-staging and counselling.

O152 HIGH INTENSITY INTERVAL TRAINING (HIT) SIGNIFICANTLY IMPROVES FITNESS WITHIN 31 DAYS IN THE ELDERLY
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Introduction: Many solid organ cancers, requiring major surgery for cure, occur in elderly and unfit populations. Improving fitness for surgery is a challenge within the 31 day window available from the decision to treat. We aimed to improve the fitness of a group of elderly volunteers within 31 days with HIT and to assess whether the exercise regime was acceptable.

Method: With University Ethics Committee approval, healthy volunteers, 60 – 75 years, were recruited. Baseline measurements included cardiorespiratory exercise testing and quality of life questionnaires. Participants underwent 12 HIT sessions on a stationary cycle ergometer within a 31 day period. Baseline measurements were repeated and data about acceptability of the programme was collected via a questionnaire.

Result: 21 participants (8M:13F, 67±2.8 years) completed the study in within 31 days. HIT training lead to significant improvements in performance in: mean time to failure (740±106 vs. 801±138s, p<0.0001), wattage at failure (137±40 vs. 154±44W, p<0.0001), VO2peak (23.9±4.7 vs. 26.2±5.4 ml/kg/min, p=0.0014) and anaerobic threshold (20.4±4.1 vs. 22.9±4.5 ml/kg/min, p=0.02). All participants enjoyed training and would recommend it to friends. Training was not reported as a significant time burden and group exercise would not have been preferred.

Conclusion: This study demonstrates it is possible to improve cardiovascular fitness in an age group commonly affected by colorectal cancer. This improvement is possible in time frames imposed by cancer treatment targets in a way that is acceptable to subjects. A study will now be performed in patients with colorectal cancer in the 31 days prior to surgery.

Take-home message:
Significant improvement in cardiovascular fitness in a population age matched to those with colorectal cancer is possible within the time frame imposed by cancer management guidelines

O153 PERSISTENT LYMPHOPENIA IS ASSOCIATED WITH INCREASED MORTALITY IN CRITICALLY ILL EMERGENCY SURGICAL PATIENTS
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Introduction: Serial lymphocyte counts are routinely measured in critically ill patients, but evidence to guide the interpretation of these values is lacking. We aimed to determine whether lymphocyte count was associated with mortality in Emergency General Surgery (EGS) patients, and whether a persistently low lymphocyte count was an independent predictor of mortality.

Method: We retrospectively reviewed a prospectively compiled database of adult EGS patients requiring ICU admission at our institution between 2002-2013. Only patients with evidence of organ dysfunction on admission to ICU were included. Lymphocyte counts obtained from the day of ICU admission through to day 7 were recorded. The primary outcome measure was survival to hospital discharge.

Result: 173 patients were included in the study. 135 patients [78%] had a low lymphocyte count at admission to ICU and 91% (158/173) developed lymphopenia on at least one occasion. Lymphocyte counts were lower among non-survivors compared to survivors on each day from day 2 of ICU admission [0.62 vs 0.81, p=0.03] through to day 7 [0.87 vs 1.15, p=0.009]. Patients with persistently low lymphocyte counts during the study period had significantly higher mortality compared to patients who initially demonstrated lymphopenia but regained a normal value [64% vs 23%, p<0.001]. On multivariate regression analysis, persistent lymphopenia was independently associated with increased in-hospital mortality [odds ratio 3.5 (1.7-7.3), p<0.001].

Conclusion: Lymphopenia is commonly observed in critically ill EGS patients. Persistent lymphopenia is an independent predictor of increased mortality in this patient group.

Take-home message:
Lymphopenia is commonly observed in critically ill emergency surgical patients. Persistent lymphopenia is an independent predictor of increased mortality in this patient group.

O154 FRAILTY SPECIFIC FACTORS AFFECT PATIENT RELEVANT OUTCOMES IN OLDER PATIENTS UNDERGOING AN EMERGENCY LAPAROTOMY

Take-home message:
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**Introduction**: The emergency laparotomy (EL) is associated with significant morbidity and mortality specifically within the older patient. This has significant service ramifications given the increasing age of the population. Frailty is one facet of aging that has been shown to significantly affect outcomes in a range of medical and surgical specialties.

**Method**: Data on consecutive older patients (>65 years) undergoing an EL over one year period was collected. - baseline demographics, indications for EL, markers of frailty (comorbidity, physical function, nutrition, cognition and markers of a geriatric syndrome and social vulnerability). We assessed the impact of such markers on mortality, length of stay (LOS) and discharge to a (DTC) using multivariate analysis (p<0.05).

**Result**: A total of 361 patients underwent an EL of which 169 patients were > 65 years. Of these 169, 21 patients died in hospital (12%) with a median LOS of 20 days (IQR 12-34 days). 30-day and 12-month mortality were 10% and 27% respectively. Mortality: Increasing age, lack of independent mobility on admission, Katz score, malnutrition and daytime surgery were significant independent predictors of increased mid term mortality. LOS: Lack of independent mobility on admission, depression, polypharmacy, memory problems, malnutrition, haemaglobin, white count and serum sodium were independent predictors of prolonged LOS ( > 20 days). DTC: Katz score and serum creatinine were independent predictors of requirement for DTC.

**Conclusion**: Preadmission and in hospital frailty specific factors predict poor outcomes in older patients undergoing EL. Such “at risk patients” may benefit from early identification and targeted therapy to promote better outcomes.

**Take-home message**: Frailty specific factors predict poor outcome in older patients undergoing an EL. Identifying relevant factors allows for targeted intervention which may promote better outcomes.

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O155 DEVELOPMENT OF ATRAUMATIC, NON-SLIP, FORCE-CONSTRAINED LAPAROSCOPIC FORCEPS
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**Introduction**: Surgical manipulation leads to an intestinal inflammatory response that contributes to post-operative ileus, increases the risk of complications and delays discharge. There is an immediate need for totally atraumatic, instruments. Study design We have manufactured polymer micropillar arrays with custom geometry and hydrophilicity. We applied this novel adhesive surface to the jaws of standard laparoscopic forceps and integrated force and displacement sensors into the handles to enable calculation of the force applied to tissue. Parametric studies will investigate the influence of key factors (geometry, hydrophilicity, retraction force, grasping force) on the grip and retraction performance of the modified forceps. Ex-vivo porcine tissue will be used. After mechanical testing, tissue damage will be assessed histologically to define ‘safe’ limits. Pilot data An adhesive force of 70mNcm-2 was achieved with micropillars applied to peritoneum. The surface provided resistance to lateral traction with a high friction coefficient of 1.5. A capillary mechanism is proposed, as hydrophobic surfaces were not adhesive. Recorded data from the instrumented forceps demonstrate accurate measurement of the tissue-jaw interaction forces and display the visco-elastic properties of tissue. A pronounced relaxation phase seen during extended holds may be correlated with tissue trauma. Forward plan In-vivo animal studies will allow tissue stress to be quantitatively correlated with histochemical changes, defining the inflammatory response associated with surgical manipulation. This data will inform the force constraints of a working prototype. Limiting tissue stress in this way can potentially eliminate the intestinal inflammatory response and further enhance the benefits of laparoscopic surgery.

**Take-home message**: We have developed atraumatic laparoscopic graspers that combine two novel technologies, force sensing and limiting handles and an atraumatic adhesive surface. This project will evaluate the mechanical stresses placed on tissue and define the restraints required to avoid tissue damage.