

4B MEDICAL STUDENT PRIZE

O101 A PROSPECTIVE STUDY COMPARING FLIR ONE WITH LASER DOPPLER IMAGING IN THE ASSESSMENT OF BURN DEPTH BY A LARGE TERTIARY BURNS UNIT IN THE UNITED KINGDOM

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Introduction: Thermal imaging may have a potential role in burn depth assessment. Current prototypes have limited clinical use. FLIR One is a miniature thermal imaging camera; mountable to a smartphone and ready to use with the corresponding mobile application. Although the detection of temperature range is narrower and the images produced have lower resolution in comparison to the larger more expensive thermal imaging cameras, it is a cheaper alternative. This study aims to assess the practicality of FLIR One for its clinical application and to compare against Laser Doppler Imaging (LDI) in the burn depth assessment.

Method: 30 burn wounds of total body surface area (TBSA) less than 10% presenting within 72 hours of injury were included for assessment. Patients were divided into groups according to wound healing potential of a) less than 14 days, b) between 14 and 21 days and c) above 21 days. We correlated healing potential prediction of FLIR One against the LDI. This study has been approved by the ethics committee.

Result: The incorporation of FLIR One into service provision was easy. However, there was a learning curve for the interpretation of images. Subjective evaluation using colour coded temperature scale did not always clearly corresponded with healing potential groups. We found that the accuracy of FLIR One was comparable to LDI.

Conclusion: FLIR One signifies the beginning of wide availability of 'real-time' thermal imaging. Our experience with the device was positive. However, more research into the influence on environmental factors on its accuracy is required.

Take-home message:

Our experience with the device was positive: we found that the accuracy of FLIR One was comparable to LDI. However, more research into the influence on environmental factors on its accuracy is required.

O102 TREATMENT OF HYPERHIDROSIS WITH ORAL ANTICHOLINERGIC MEDICATIONS: A SYSTEMATIC REVIEW

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Introduction: Primary hyperhidrosis is a condition characterised by excessive sweating. Patients are treated off-licence with oral anticholinergic medications, and report side effects associated with systemic anticholinergic interactions. This review assesses clinical evidence of efficacy, impact on quality of life and side effects associated with oral anticholinergic therapy for primary hyperhidrosis.

Method: PRISMA guidelines were implemented to complete a systematic review (PROSPERO:CRD42016036326). MEDLINE, EMBASE and PubMed were searched from 1946-2015. Inclusion criteria included: observational and experimental studies; anticholinergic medication use in primary hyperhidrosis; oral therapy; clear diagnostic and outcome measures.

Result: Twenty-three articles relevant to the inclusion criteria were analysed. Oxybutynin therapy improved symptoms in an average of 76.2% (range 60-97%) patients and improved QOL in 75.6% (range 57.6-100%) of patients. Methantheline bromide therapy was associated with a 41% reduction in axillary sweating, 16.4% reduction in palmar sweating, 25% decrease in HDSS score and 40.9% increase in DLQI score. Outcome measures of glycopyrrolate therapy were too variable to collate. Dry mouth was reported in 73.4% (range 43.3-100%) of participants taking oxybutynin 10 mg/d, 38.6% (range 27.8-63.2%) of patients taking glycopyrrolate and 68.8% of patients taking methantheline bromide. Nine studies reported that patients stopped therapy due to side effects. In eight of these studies a mean of 10.9% of total participants ceased treatment due to dry mouth.

Conclusion Evidence of oral anticholinergic therapy for hyperhidrosis is limited. However, its use is associated with improvement in quality of life and clinical symptoms but at the cost of considerable side effects.

Take-home message:

Evidence of anticholinergic therapy for hyperhidrosis is limited. This review shows that anticholinergic medication improves symptoms but at the cost of dry mouth and other side effects.

O103 THE INCIDENCE OF STOMA-RELATED MORBIDITY – A SYSTEMATIC REVIEW OF RANDOMISED CONTROLLED TRIALS

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Introduction: Ileostomy or colostomy may be formed temporarily to protect a distal anastomosis or as a permanent measure following colorectal resection. There is a risk of stoma-related morbidity following

these procedures. We aimed to identify the nature and rate of these complications.

Method: The review was performed in accordance with PRISMA guidelines. PubMed, CINAHL and the Cochrane Library were searched for randomised controlled trials reporting stoma-related morbidity. Data concerning demographics, operative details and stoma-related complications were extracted by two independent reviewers and entered into SPSS for statistical analysis. The Cochrane Collaboration tool for assessing risk of bias was used to critically appraise each study. Cochran's Q and I² were used to measure heterogeneity.

Result: Searches identified 4,359 studies, of which 18 were included for analysis. The incidence of stoma-related complications ranged from 2.9%-81.1%. Peristomal skin complications and parastomal hernia were the commonest conditions. End colostomy had the highest incidence of morbidity (62.6%), followed by loop colostomy (26.3%) and loop ileostomy (14.3%). There were no data for end ileostomy. There was a high level of heterogeneity between studies and a high risk of detection bias.

Conclusion: This systematic review has summarised the best available evidence concerning the incidence of stoma-related morbidity. The high level of heterogeneity between studies has limited the accuracy of the effect estimate. Large, multi-centre trials investigating homogenous participant populations are therefore required. The development of standard definitions of complications or use of a core outcome set for trials in stoma surgery might improve their quality and comparability.

Take-home message:

The reported incidence of stoma-related complications is highly variable. Standard definitions for complications and use of a core outcome set for trials in stoma surgery would improve the quality and comparability of future studies.

0104 URINARY ANTIMICROBIAL PROTEIN LEVELS AND FUNCTION ARE SIGNIFICANTLY DEGRADED BY PANCREAS TRANSPLANT EXOCRINE SECRETIONS

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Introduction: Pancreas transplantation restores endocrine insulin secretion in type-1 diabetes mellitus. The pancreas graft also produces exocrine digestive enzymes, which can be drained enterically (ED) or via the bladder (BD). BD recipients can experience a high incidence of urinary tract infections (UTI), but have a lower rate of anastomotic leakage and the urinary amylase levels can be monitored for rejection

Method: Quantitative PCR analyses determined AMP gene expression in infected bladder RT4 cells and these data were used to direct Human β -defensin 2 (HBD2) and Lipocalin (LCN2) measurements via ELISAs in urines of ED (n=29) and BD (n=22) patients. Urine amylase was determined using a colorimetric assay (Sigma). Bacterial growth curves and time-kill assays were used to evaluate in vitro the effects of AMPs and pancreatin 31,250U/L \pm 12,500U/L and pancreatin (mimicking urine amylase levels) on uropathogenic *Escherichia coli*.

Result: In the presence of 31,250U/L pancreatin a significant increase (p=0.001) in bacterial growth rate was demonstrated. Patient urine LCN2 concentrations were negatively correlated with amylase (r²=0.57, p=0.01), although HBD2 concentrations were not (r²=0.06, p=0.42). In vitro, significant killing (mean survival=60%; p=0.003) of all strains was observed with HBD2 (300ng/mL), but in presence of pancreatin no bacterial killing was detected (mean survival=125%).

Conclusion: These in vitro and in vivo data support the hypothesis that pancreatic exocrine secretions impact on the bladder environment and reduce the bladder innate defences predisposing to recurrent UTIs. Abbreviations: BD=bladder drained ED=enteric drained ELISA=enzyme-linked Immunosorbent assay HBD2=human β -defensin 2 LCN2=lipocalin 2 PCR=polymerase chain reaction UTI=urinary tract infection.

Take-home message:

Pancreatic exocrine secretions degrade bladder antimicrobial protein levels and function. Thus reducing bladder innate defences and predisposing individuals to urinary tract infection.

0105 OUTCOME MEASURES REPORTED IN PUBLISHED CLINICAL RESEARCH STUDIES OF INTERVENTIONS FOR PATIENTS WITH CRANIOSYNOSTOSIS: A SYSTEMATIC REVIEW

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Introduction: Craniosynostosis is the premature fusion of the bones of the skull in children. The literature is expected to be prone to the use of variable outcomes and reporting bias. This impairs the comparison of treatments across different studies, but has not previously been assessed.

Method: A Cochrane and PRISMA-compliant systematic review was performed following a registered protocol. Studies were sourced via a search of PubMed, Cochrane, AMED, EMBASE, WHO Trials Registry and Clinicaltrials.gov. All primary, interventional studies for craniosynostosis published in the previous

five years (2011-2015) were reviewed. The individual outcomes reported, whether the outcomes were defined and whether the outcomes were pre-specified in the methods, were all recorded.

Result: Of 1027 studies screened, 240 were included and proceeded to data extraction. These studies included 18,365 patients. 2190 separate outcomes were reported. Of these, 852 outcomes (38.9%) were clearly defined, 1392 (63.6%) were pre-specified in the methods, and 800 outcomes (36.5%) were both defined and pre-specified. Clinical and functional; was the most commonly reported outcome theme (891 outcomes, 41.0%), and Patient-reported outcomes the least (6 outcomes, 0.3%). Duration of surgery was the most commonly reported single outcome (reported 80 times). Cranial index was the most variably defined outcome (17 different definitions used).

Conclusion : The outcomes reported following treatment interventions for craniosynostosis are incompletely and variably defined. Improving definitions for these outcomes may aid comparison of different management strategies, and improve craniosynostosis care. Sub-optimal pre-specification of these outcomes in the study methods implied that outcome reporting bias cannot be excluded.

Take-home message:

The outcomes reported following treatment interventions for craniosynostosis are incompletely and variably defined.

O106 THE ROLE OF COGNITIVE TRAINING IN ENDOUROLOGY: A RANDOMISED CONTROLLED TRIAL

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Introduction: Cognitive training is an important training modality which can be used to enhance acquisition of new technical skills making it an area of interest in the training of surgeons. The use of cognitive training in surgery is currently not clear cut and so this study aimed to determine whether, relative to a control condition, the use of cognitive training improves technical surgical skills on a ureteroscopy simulator.

Method: This study recruited 59 medical students and randomised them to one of three groups: control - simulation training only (n=20), flashcards training group (n=20) or mental imagery training group (n=19). All participants completed three tasks at baseline on the URO Mentor simulator followed by the cognitive intervention if randomised to receive it. Participants then returned to perform an assessment task on the simulator. Outcome measures from the URO Mentor performance report was used for analysis and a quantitative study was given to all participants pre and post study.

Result: This study showed cognitive training to have minimal effects on technical skills of participants. The mental imagery group had fewer laser misfires in the assessment task when compared to both control and flashcards group (p=0.017,0.036). The flashcards group rated their preparation to be most useful when compared to control (p=0.0125). Other parameters analysed in comparison between the groups did not reach statistical significance.

Conclusion: This study has shown that the role of cognitive training within acquisition of surgical skills is minimal and that no form of cognitive training was superior to another.

Take-home message:

Cognitive training has a minimal role in the acquisition of surgical technical skills and further research needs to be done in order to improve cognitive training methods.

O107 INVESTIGATING THE LINK BETWEEN VENOUS THROMBOSIS AND ATHEROSCLEROSIS

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Introduction: Epidemiological evidence suggests that deep vein thrombosis (DVT) is associated with an increased risk of myocardial infarction and stroke, which persists for over 20 years. It is unclear, however, if a direct causal relationship exists between DVT and atherosclerosis. The aim of this study was to determine whether DVT accelerates plaque progression in animal models of atherosclerosis.

Method: Venous thrombosis or sham operation was surgically induced in the inferior vena cava of ApoE^{-/-} and LDLr^{-/-} mice fed a high fat western diet for a minimum of 3mths. Plaque size was assessed longitudinally using magnetic resonance imaging (MRI), with histological analysis carried out at 28days following thrombus induction. In a separate group of LDLr^{-/-} mice, 7day old thrombus was lysed using tissue plasminogen activator and thrombus and plaque size measured at day 28 by MRI and histology.

Result: Brachiocephalic artery plaque volume was 33% larger in ApoE^{-/-} mice with a DVT (2.4±0.15mm³ vs 1.8±0.11mm³ in sham controls, n=6/gp, P<0.01) measured by MRI and confirmed by histology. The cross-sectional area of the aortic sinus plaque was 18.3% larger in LDLr^{-/-} mice with a DVT (53.0±2.2% vs 34.8±2.6% in sham controls, n=20-22/gp, P=0.017) measured by histology. Removal of thrombus with lysis significantly attenuated the effect of DVT on accelerated plaque progression (P=0.03).

Conclusion: DVT accelerates the progression of atherosclerotic plaque in both ApoE^{-/-} and LDLr^{-/-} mice fed a high fat western diet. Early removal of thrombus can prevent plaque progression. Further studies are underway to elucidate the mechanisms that regulate this process.

Take-home message:

DVT accelerates the progression of atherosclerotic plaque in both ApoE^{-/-} and LDLr^{-/-} mice fed a high fat western diet. Early removal of thrombus can prevent plaque progression.

O108 RUNX2, THE MASTER REGULATOR OF BONE METASTASIS?

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Introduction: RUNX2, a bone-specific transcription factor, has been widely proposed as the key regulator of bone metastasis, including of breast cancer. To date however, expression levels of RUNX2 in human tumour cells have not been elucidated. Our aim was to determine the expression of RUNX2 in primary breast tumours that eventually spread to bone, compared to those that did not.

Method: Primary breast tumours were collected and differentiated into two groups; those from patients that did develop bone metastases, and those from patients that did not. RNA was extracted from these tissues and RUNX2 gene expression analysis was accomplished via RT-PCR. Statistical analysis was performed using Minitab software.

Result: 27 breast tumours that metastasised to bone, and 20 that did not, achieved adequate RNA concentrations for gene expression analysis. There was no significant difference in RUNX2 expression between those cancers that spread to bone versus those that did not ($p=0.47$). Furthermore, there was no association between RUNX2 expression and tumour size ($p=0.383$), tumour grade ($p=0.518$), histological subtype ($p=0.603$), presentation with metastatic disease ($p=0.482$).

Conclusion: In the first study analysing RUNX2 expression in human tumours, we have determined that RUNX2 is not expressed at higher levels in primary breast cancers that spread to bone. Having established that RUNX2 is not upregulated at the primary site, we can now advance to comparison of RUNX2 levels in metastatic bone tumours versus breast primaries.

Take-home message:

Runx2, proposed as a key regulator of the bone metastatic process, does not have greater expression in primary breast tumours that spread to bone, versus than those that do not. This is the first step in a research programme evaluating the role of RUNX2 in metastatic bone disease.

O109 AUDIT OF THE ENT UNDERGRADUATE CURRICULUM: A PAIN IN THE NECK FOR GRADUATES

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Introduction: Undergraduate training in ENT is currently lacking despite a large clinical burden on GP clinics and emergency departments. Aims We aimed to audit the current teaching practice at UK medical schools against the new SFO UK (Student and Foundation Trainees in Otolaryngology) ENT undergraduate curriculum in order to guide further curriculum development.

Method: An online survey was created using Google forms asking about coverage of items listed on the new curriculum. The survey link was distributed to medical students and Foundation trainees via relevant email mailing lists from societies, medical schools, foundation schools and social media groups. The survey collected responses over 2 months.

Result: 146 responses were collected from 23 UK medical schools. Topics that were consistently well covered included anatomy and physiology of the ear and nose (94% and 83% respectively), and examination of the ear (93%). Head and neck topic coverage was less consistent (56% to 84%). Salivary pathology was covered in less than 60%. ENT skills including nasal packing and cautery showed consistently poor coverage (32% and 27% respectively). Airways obstruction was covered well (85%) but other ENT emergencies showed poor coverage (15% to 45%).

Conclusion: Current ENT undergraduate teaching covers many important areas of the new ENT curriculum well, but more focus is required in the certain areas of ENT emergencies, head and neck cancer and nasal packing/cautery.

Take-home message:

The ENT undergraduate curriculum would benefit from further development to enable doctors of any specialty, particularly in primary care and emergency, to feel confident in assessing and managing ENT conditions safely.

O110 NON-INVASIVE EXHALED BREATH VOLATILE ORGANIC COMPOUND ANALYSIS FOR THE DIAGNOSIS OF PANCREATIC CANCER

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Introduction: Pancreatic cancer often presents at an advanced stage with a poor prognosis due to the silent nature of the disease. Volatile organic compounds from alveolar breath have shown potential as novel biomarkers to detect other cancers at an earlier stage. This pilot study aims to quantify differences in abundances of breath volatiles in pancreatic cancer and non-cancer cohorts and generate cancer risk prediction models.

Method: Patients with localised pancreatic cancer were recruited prior to surgical resection or from endoscopic ultrasound. Metastatic patients were recruited from oncology clinics. The non-cancer cohort, consisting of positive control (other pancreatic disorders) and normal pancreas groups, were recruited from the hepatopancreatobiliary clinics and ultrasound departments respectively. Exhaled breath was collected from all patients using inert aluminium bags, pumped onto thermal desorption tubes for storage and then analysed using gas-chromatography mass-spectrometry.

Result: 68 patients were recruited and sub-grouped into localised adenocarcinoma (n=7), localised neuroendocrine tumour (n=4), metastatic adenocarcinoma (n=10), metastatic neuroendocrine tumour (n=4), positive control (n=20) and normal pancreas (n=23) groups. Of 67 volatiles identified, 14 were revealed to have significantly different ($p \leq 0.05$) abundances on univariate analysis between cancer and non-cancer cohorts. Receiver operating characteristic analysis produced an area under the curve of 0.929 distinguishing cancer and non-cancer (sensitivity 84%, specificity 97.6%) and 0.979 distinguishing adenocarcinoma and non-cancer (sensitivity 88.2%, specificity 95%).

Conclusion : These results suggest that breath volatiles may have the potential to distinguish pancreatic cancer from non-cancer controls and provides the foundation for a larger multi-centre study.

Take-home message:

Quantification of exhaled breath volatile organic compounds may have the potential to distinguish pancreatic cancer from non-cancer controls.

O111 COMPARING THE EFFECTIVENESS OF TEACHING SUTURING BY PEERS, CORE SURGICAL TRAINEES AND CONSULTANTS

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Introduction: The value of peer-assisted surgical teaching of basic surgical skills has not been evaluated compared to near peer-teaching and consultant-led teaching. This study thus aimed to assess the effect of suturing sessions taught by peers, post-graduate surgical trainees (Core Surgical Trainees (CSTs)) and Consultant surgeons.

Method: The Surgical Society hosted a basic suturing skills course. 60 participants were recruited on the basis that they had never done or seen suturing being performed. Participants were randomly allocated to three groups: peer-taught, CST-taught and Consultant-taught. Participants were taught basic suturing techniques for two hours. Subsequently, students were assessed via the Objective Structured Assessment of Technical Skill (OSAT) marking scheme provided by the Royal College of Surgeons in their surgical skills courses by a Consultant surgeon. Group differences were assessed using a one-way Anova with a post-hoc Tukey.

Result: 17 marks are available on OSAT. The average scores for those taught by peers, CSTs and consultants were 14.47, 14.06 and 14.67 respectively. These differences were not statistically significant ($p=0.5321$).

Conclusion: Peer or near-peer teaching of technical surgical skills is comparable to that of consultants in medical students with no previous surgical experience. This can have significant impact on the delivery of surgical education in medical school curriculum. More research is required to see if this applies to advanced skills. The effectiveness of being taught basic surgical skills by peers, junior and senior surgeons may be similar.

Take-home message:

Peer-teaching may provide an equally useful means of teaching students basic surgical skills compared to consultant-led teaching.

O112 COMMON PERONEAL NERVE STIMULATION SIGNIFICANTLY REDUCES IN-VIVO ERYTHROCYTE AGGREGATION IN THE POPLITEAL VEIN

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Introduction: As blood flow slows, erythrocytes aggregate into ultrasound detectable echogenic particles. This has been linked with flow stasis and deep vein thrombosis. The common peroneal nerve stimulator (CPNS) is a UK approved device for reducing venous thromboembolism (VTE) risk. The aim was to determine the effect of CPNS on erythrocyte aggregation using the ultrasound derived venous sludge index (VSI).

Method: Twenty-five healthy volunteers had their right popliteal vein video recorded (B-mode ultrasound at 22 frames per second) in transverse and longitudinal views, standing and lying, with the CPNS off and then with the CPNS on. For image analysis, a single frame out of the possible 154 frames (7 seconds) was selected using a random number generator. The VSI, a grey scale index (0-255), was used to quantify the brightness of the erythrocyte aggregates within a circular sampling area, where black = 0 and white = 255.

Result: Expressed as median (inter-quartile range). In transverse view standing, CPNS reduced the VSI from 20.7 (13.6 - 32.2) to 1.1 (0.6 - 2.7). On lying the VSI reduction was from 11.4 (6.3 - 15.9) to 0.8 (0.5 - 2.1). The corresponding results examined in longitudinal view were from 27.7 (18.8 - 41.4) to 2 (1.1 - 3.2) standing, and from 11.7 (5.5 - 17.5) to 1.5 (0.5 - 3.1) lying. All reductions were significant at $P < .0005$ (Wilcoxon).

Conclusion : The CPNS significantly reduces erythrocyte aggregation. Future work is required to determine whether this translates into a reduction in VTE risk.

Take-home message:

Common Peroneal Nerve Stimulation significantly reduces erythrocyte aggregation in the popliteal vein, a common site for stasis and deep vein thrombosis.

O113 SK-IV MOISTURE MONITOR IS A POTENTIAL TOOL TO ASSESS HYPERHIDROSIS

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Introduction: Hyperhidrosis is a condition of excess sweating. Research, diagnosis and treatment are guided by self-assessment questionnaires or expensive, cumbersome equipment. There is currently no cheap, accurate, practical instrumentation to objectively measure sweating. This study investigated the potential of the cheap, pen-sized, cosmetic SK-IV Moisture Monitor to objectively assess sweating.

Method: 45 volunteers with comparable demographics were recruited (15 with palmar hyperhidrosis; 19 female, aged 19-28 years). Investigations were undertaken using three SK-IV monitors to: 1. Determine inter and intra variability in machine recordings. 2. Demonstrate a variation in detected moisture in non-hyperhidrosis volunteers following exercise or application of moisturising cream. 3. Demonstrate a variation in machine detected moisture in volunteers with palmar hyperhidrosis compared to those without. 4. Correlate the degree of instrument detected moisture with a validated visual analogue scale.

Result: The Monitor has an average coefficient of variation of 2.8%. A degree of variation between average values of Monitors was shown. This was still within the range of the coefficient of variation. Significant differences ($p < 0.05$) in baseline hydration values were observed in healthy individuals before and after exercise; in healthy individuals following application of moisturising cream; and at rest between healthy and palmar hyperhidrosis individuals. There was a good correlation ($r^2 = 0.85$ $p < 0.01$) between the monitor displays a saturation effect at skin hydration values and the Visual Scale for the Quantification of Hyperhidrosis.

Conclusion: The reliability, accuracy, practicality and price of the SK-IV Moisture Monitor makes it a novel addition to the currently available methods of hyperhidrosis assessment.

Take-home message:

This study demonstrates the validity of a cheap, easy to use instrument to measure hyperhidrosis.