INTERCALATORS

INSPIRE SYMPOSIUM

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INSPIRE

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The Academy of Medical Sciences

INTERCALATING DEGREE ABSTRACTS

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FOREWORD

This abstract book contains an exciting collection of abstracts submitted by some of the intercalating students at the University of Aberdeen. Their work will be showcased at the Inaugural Intercalators Research Symposium. The half-day symposium is dedicated for MBChB intercalating students who undertook a BSc (Hons) or Masters programme to present their research work.

This "INTERCALATORS INSPIRE SYMPOSIUM" aims to ensure every student undertaking academic activities in the School of Medicine, Medical Sciences and Nutrition has the opportunity to present their research in a formal, scientific setting and receive feedback on their performance. This is currently not possible for all intercalating students and is largely supervisor-dependent. Therefore, this symposium, a collaboration with the Aberdeen Student Society for Academic Medicine (ASSAM) will help provide a platform for all students to share their research work.

We look forward for significant student participation as these intercalating degrees are relevant to many students who will be inspired by their colleagues' works. Prizes offered at the symposium will reward excellence and achievement which will further help promote excellence in research.

I would like to thank Mrs Janice Forsyth who provided administrative support for the symposium and Mr Jesus Perdomo Lampignano for designing the abstract book. Special thanks go to all students who submitted their work to share their research with the wider student community. Finally, on behalf of Aberdeen Clinical Academic Training Programme, I would like to thank the Academy of Medical Sciences which provided INSPIRE funding, without which this essential event would not have been possible.

Prof. Phyo Kyaw Myint

INSPIRE Lead & Director of Clinical Academic Training and Development
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ABSTRACTS

IBRAHIM ALAM

Exploring clinicians' attitudes towards digital health apps for chronic pain .

Background

Chronic pain is a prevalent condition and is debilitating to its sufferers. The use of digital health apps to monitor and self-manage patients is one of many techniques that can potentially help clinicians make decisions on the medical treatments their patients receives. This research project looked specifically on the views of clinicians towards digital health apps, as opposed to the general views.

Methods

This study firstly conducted a literature review to investigate clinicians' views. Subsequently, two clinician stakeholders were asked about their thoughts on the evidence from the literature review and on a chronic pain app called Fibromapp in a stakeholder involvement exercise.

Results

A small proportion of studies were found in literature searches which focused specifically on clinicians' attitudes, which were generally positive. One of the main themes highlighted throughout the stakeholder involvement exercise was that pain apps may initiate patients to think too much about their pain and increase disease burden. Nevertheless, the use of Fibromapp in short terms setting can bring convenience to clinics.

Conclusion

From the limited evidence base in different types of studies, the overall attitude towards digital health apps from the literature review was positive, as was the attitudes from the limited number of stakeholders in the study. Barriers to the use of apps arise from the same ones seen in any self-management initiative, where patient education and acceptance of pain condition is paramount. In terms of Fibromapp, the clinicians believe that meticulous recording and tracking chronic pain can worsen their experiences of their condition and that the app would be more useful as short snapshot diary if the clinician was in the process of reviewing patients.

WILLIAM ERIC ALTON

Do existing chondrocytes form new cartilage after injury or in osteoarthritis?

Background

Human articular cartilage is prone to damage, both through acute injury and the chronic remodelling process of osteoarthritis. Despite this, it possesses a low capacity for repair. Knowledge of the source of cells infiltrating into areas of healing may catalyse identification of new treatment avenues. This study assessed the extent to which Collagen Type 2 (Col2) lineage cells contribute to repair in the murine joint surface injury (JSI, acute injury model) and to remodelling in the destabilisation of the medial meniscus (DMM, chronic injury) model.

Methods

Cell labelling was assessed in Col2-CreER;TdTomato transgenic mice, in which tamoxifen was used to induce Tomato expression within Col2-lineage cells at two time points, providing an indication of whether cells predominantly originated from the growth plate or articular cartilage. Two independent scorers recorded all data and Bland Altman plots showed strong congruence.

Results

A mean of 27.0% (SD 16.1%) Col2-lineage cells was found at the site of injury in the JSI model. Increased cell number correlated significantly ($p<0.05$, $R2=0.27$, $n=15$) with an increase in repair as assessed by the modified Wakitani scoring system. Using the DMM model and the tamoxifen timed cohorts, the data indicated that 28.3% (SD 5.4%) of the Col2- lineage cells arose from articular cartilage and 8.5% (SD 8.6%) from growth plate cartilage ($n=11$, $p<0.01$).

Conclusion

This proof-of-concept study demonstrates pre-existing Col2-lineage cells accumulate at sites of repair and remodelling in the murine knee, identifies at least two sources for these cells and suggests potential new therapeutic approaches based on these findings.

RACHAEL ANNANDALE

Does pulmonary rehabilitation improve anxiety and depression in interstitial lung disease? A systematic review and meta-analysis.

Background

Interstitial lung diseases (ILD) are a group of rare and often disabling lung conditions that are typically progressive in nature. In addition to the physical symptoms, living with an ILD can have a profound effect on psychological wellbeing and quality of life (QoL). This systematic review and meta-analysis aims to evaluate the effectiveness of pulmonary rehabilitation (PR) in improving anxiety, depression, QoL and fatigue in patients with ILD.

Methods

The databases CINAHL, Cochrane Central, Embase, PsycINFO and MEDLINE were comprehensively searched and a hand search of references of relevant literature performed. All studies that met the eligibility criteria were included in the review. The risk of bias and study quality of included articles were assessed, and data extraction of study characteristics and outcomes measures was conducted. Where possible, quantitative analysis was performed.

Results

Eight studies, which enrolled a total of 488 participants, were included in the review. PR was found to significantly improve anxiety (MD 0.76, 95% CI: 0.38-1.14, P<0.0001) and fatigue (MD 1.50, 95% CI: 1.25-1.75, P<0.00001) in the short-term. There was no significant improvement in depression (MD 0.15, 95% CI: -0.06-0.35, P=0.16) and overall QoL (MD 2.10, 95% CI: -1.34-5.54, P=0.23), as measured by the St George's Respiratory Questionnaire (SGRQ).

Conclusion

This study determines PR to be an effective intervention for fatigue and symptoms of anxiety in ILD patients. The long-term benefits of PR are still unknown and should be further investigated in future research. More research is also needed to determine the optimum duration and content of ILD-specific PR programmes.

SHINA ADRANI

Do existing chondrocytes form new cartilage after injury or in osteoarthritis?

Background

Cartilage is an avascular structure that is known for healing inefficiently. In degenerative diseases such as osteoarthritis, ectopic cartilage is often formed in an attempt to repair the eroded cartilage. This project aimed to determine whether existing chondrocytes in the growth plate and articular cartilage contributed to forming new cartilage after injury and/or in forming ectopic cartilage in osteoarthritis. Col2-CreER;TdTomato transgenic mice were used in joint surface injury (JSI) and destabilisation of medial meniscus (DMM) injury models to study contribution of labelled chondrocytes to cartilage repair after injury and their contribution in forming ectopic cartilage, respectively. Data revealed in the joint surface injury model, 14 out of 15 mice had contribution of chondrocytes from articular and/or growth plate cartilage in the repair tissue formed at injury site. In the model looking at ectopic cartilage formation, 10 out of 11 mice had contribution from existing chondrocytes in the formed osteophyte . In the DMM model labelling was performed at two different time points with the growth plate and articular cartilage being labelled at 2 weeks and only the growth plate cartilage being labelled at 8 weeks. There was found to be a statistically significant difference (p-value 0.0087) in percentage of Tom+ cells in osteophyte between the groups labelled at 2 and 8 weeks with the 2 week labelled group having a higher percentage of Tom+ cells in the osteophyte. Our findings provide a better understanding of the role of existing chondrocytes in cartilage repair.

ABDUL-MUIZ AZRI YAHAYA

Investigating Patterns of Muscle Activity Contributing to Non-Contact ACL Strain.

Background

Anterior cruciate ligament (ACL) injuries are one of the most common sporting injuries in the world with 70% of them being Non-contact ACL (NCACL) injuries. Surgical ACL reconstructions are estimated to cost the NHS £63 million each year, thus there is clear motivation to investigate the mechanism of injury, and the means by which injury can be prevented.

Methods

This study aimed to measure kinetic and kinematic parameters during a single-legged jump landing movement of 20 participants, using VICON© Nexus Motion Capture Software and force plates. Freebody software, which uses a novel inverse dynamics approach, was used to estimate the musculoligamentous and joint reaction forces during each trial. ACL load was estimated using the anterior shear force (ASF) acting on the tibia, with a correction for the ACL-tibial plateau angle. The aim was to verify musculoskeletal factors previously found to correlate with ACL load, and further identify new such correlations.

Results

Participants experienced both anterior and posterior shear at the point of landing. ASF - related to an increased risk of ACL injury, was associated with: reduced knee flexion ($p=0.0095$), reduced hip flexion ($p=0.0023$), weaker hamstrings force ($p<0.0001$), greater quadriceps force ($p=0.0007$), and a number of other parameters.

Conclusion

The magnitude of ASF and ACL load demonstrated significant correlations with a small number of kinetic and kinematic parameters, however, interpretation of these results was limited by the nature of the inverse dynamics solution. Interestingly the results suggest that the mechanism by which ASF and ACL load are generated upon landing cannot be explained purely by the 'sagittal plane mechanism' of injury that has been proposed in literature. Where conclusions can be drawn however, the results imply that strengthening hamstring muscles and landing with a slightly flexed hip and knee angle may help to reduce risk of NCACL injury.

LOUISA BOSTOCK

Operating in extreme environments: Monitoring individual characteristics and the impact of daily experience on the post-expedition reintegration.

Background

Expedition teams operating in extreme environments are frequently exposed to environmental, psychological and social challenges. This study intended to explore how individuals undertaking expeditions perform and adapt in adverse conditions effectively and to examine whether psychological adaptation to these environments is associated with particular individual characteristics. This was undertaken by monitoring situational, environmental and psychosocial factors, and coping approaches. The study also aimed to broaden the focus of previous research by exploring a relationship between the challenging nature of reintegration and daily individual expedition experiences.

Methods

Three teams embarking on separate expeditions in Arctic climates were recruited, totalling seven participants. Each participant completed pre- and post-expedition questionnaires and daily diaries throughout their expedition. Daily events and coping strategies reported were evaluated to assess their role in predicting fluctuation in individuals' affect across the expedition. Two correlational analyses were conducted to observe relationships between daily expedition experience and individual personal characteristics and between daily expedition experience and aspects of post-expedition reintegration.

Results

Results demonstrated that participants' personality traits were consistent with those reported in previous expedition studies. Temporal differences were found in events experienced and coping strategies used. Levels of positive and negative affect were predicted in relation to variability of daily events and coping strategies. Weak association was found between negative reintegration aspects, mood, negative events experienced and negative appraisal methods.

Conclusion

Results from this study have added to the continued research regarding individual characteristics and psychological adaptation of expeditioners. Findings demonstrated personality traits consistent with previous expedition studies and an overall positive experience for all participants. This study further supports the usefulness of collecting temporal data from expeditions and the findings can be used to assist further research into post-expedition return and suggests the requirement of more preparation and support for reintegration into normal life.

NICOLE BROWN & ELLA MCCATHIE

The effects of surgical and non-surgical weight loss interventions on urinary incontinence in obese women: a linked systematic review and meta-analysis.

Background

Obesity and urinary incontinence (UI) impose great burden and so due to their ever-increasing prevalence, intervention and prevention is key. Obesity is a modifiable risk factor for UI, with previous research demonstrating that weight loss interventions, may improve or cure UI in obese women.

Methods

Separate literature searches were performed on Medline, Embase and Cinahl. Papers studying females aged ≥ 18, with a BMI ≥ 25 kg/m2, undergoing surgical or non-surgical weight loss interventions, were included. All study and publication types were included. Primary outcomes were patient-reported subjective and objective cure of UI. Secondary outcomes included anal incontinence (AI), pelvic organ prolapse (POP), quality of life (QoL), sexual function and body mass index (BMI).

Results

Thirty-two studies were included that looked at surgical weight loss interventions; n = 31 were included in the meta-analysis. A statistically significant difference was found in subjective patient- reported and objective UI measures, after surgical weight loss interventions, at follow-up (RR 1.67, 95% CI 1.47, 1.90 (p <0.00001) and RR 1.89, 95% CI 1.40, 2.55 (p = 0.003), respectively). POP, QoL and BMI also demonstrated a statistically significant improvement after surgical weight loss intervention. Seven studies were included that looked at non-surgical weight loss interventions; n = 6 were included in the meta-analysis. A statistically significant difference in UI, was found after non- surgical weight loss interventions, at follow-up (RR 1.66, 95% CI 1.19, 2.33 p < 0.001).

Conclusion

Surgical and non-surgical weight loss interventions, have a significant effect on improvement or cure of UI, in overweight and obese women. Surgical weight loss interventions also have a significant effect on POP, QoL and BMI in overweight and obese women. However, more long-term follow-up, high quality, large-sample size studies, are required to confirm and strengthen these findings.

LUCY BUCHANAN

Setting up a randomised controlled trial of a complex parenting intervention: a preliminary process evaluation of the Mellow Babies Trial.

Background

The 'Mellow Babies Trial' (MBT) is a randomised controlled trial (RCT) in Highland investigating the effectiveness of a parenting support intervention on maternal and child social-emotional wellbeing. Participant recruitment to RCTs presents an ongoing challenge to scientific research. The perspectives of trial staff provide a valuable insight into the identification of factors affecting recruitment. This study is a process evaluation examining the barriers influencing participant recruitment to the MBT from the perspectives of the staff involved in its creation.

Methods

Six audio-recorded, semi-structured interviews were conducted with individuals from the core operational team working on the MBT. The 'Framework Method' was used to analyse data. Transcripts were coded using a Microsoft Excel spreadsheet and thematically indexed. An analytical framework was created and applied to further transcripts. Themes were then identified across participant responses. Results were summarised, synthesised and finally interpreted, with relevant quotations selected to illustrate study findings.

Results

The rate of recruitment failed to meet anticipated levels. Contributing factors to the slow recruitment rate were grouped under four main themes with the key barriers identified comprising: Rurality of Highland; The health visitor; Communicating the message; and The trial team.

Conclusion

Participant recruitment to complex interventions is a challenging process. Flexibility of researchers is required to enable the adaption of trial techniques to engage target populations, especially in unique locations such as Highland. Increasing stakeholder involvement, such as health visitors in the MBT, and use of Patient and Public Involvement in trial design processes might be instrumental in uncovering barriers to recruitment unseen by researchers. Mass media can be unreliable in terms of message accuracy and engagement, however, the use of social media was shown to be an effective way of reaching potential participants.

MEGAN CRAWFORD

The Future of Type 1 Diabetes Management: The Artificial Pancreas.

The burden of managing type 1 diabetes is a constant problem for patients. Recent developments in technology have produced a system called the artificial pancreas. This device incorporates an insulin pump with a continuous glucose monitor and an algorithm on an external device, which controls the insulin pump. The goal of the artificial pancreas is to, in theory, replace the endocrine function of the pancreas for type 1 diabetics.

The main aim of this thesis is to assess if the artificial pancreas is more effective than the best current treatment option, sensor augmented pump therapy. The specific aims are to identity whether the artificial pancreas can improve outcomes in terms of glycaemic control, hypoglycaemia, hyperglycaemia and patient perspective.

Significant improvements were found in 68% of the studies to increase time spent in the target glycaemic range. 56% and 60% of the trials significantly decreased time patients spent in hypoglycaemia and hyperglycaemia respectively. The artificial pancreas was found to be effective in short- and long-term trials in both clinical and non-clinical environments. There was no benefit in using systems which combined insulin and glucagon secretion when compared to using insulin alone. With regards to control algorithms applied, brand of artificial pancreas and type of continuous glucose monitors used, none were found to be more effective than others. Overall, patient perspective on the system was positive and promising.

In conclusion, the artificial pancreas may be more effective than current treatments in certain aspects, improving glycaemia levels and reducing the burden of type 1 diabetes, although there are areas which need improving and further research.

LOUIS-PIERRE GIRARD

Potential Reproductive Toxicities of Bisphenols S & F: A Systematic Review.

Background

Bisphenol A (BPA), a known oestrogenic chemical, is ubiquitous in the human environment. It is frequently used in the manufacture of plastics and resins, and is found in fire retardants, paper coatings, electronics parts, adhesives, tin can linings, and packaging of food and water. Initially identified as a benign environmental contaminant, its safety has been called into question due to potential toxic oestrogenic effects at previously untested low doses. It has been the focus of many studies, including the large-scale Consortium Linking Academic and Regulatory Insights on Bisphenol A Toxicity (CLARITY-BPA) study. Manufacturers have begun substituting BPA for alternatives such as bisphenol S (BPS) and bisphenol F (BPF). For manufacturing purposes, these chemicals are identical to BPA, and are similarly widespread in the human environment, but have significantly deficient evidence bases supporting their safety profiles, when compared to BPA.

Methods

We systematically reviewed and scrutinised the existing literature on BPS and BPF across three scientific databases, with specific regard to their potential toxic effects in reproductive systems, using the OHAT protocol. This is a protocol devised by the US National Toxicology Program' and is designed specifically to examine the human health effects of environmental contaminants. We examined ten areas of reproductive research: epidemiological studies, reproduction, pregnancy, development, testicles, ovaries, mammary glands, prostate, uterus, and sex hormones.

Results

We compiled a database of 54 relevant original articles, of which 50 were of sufficiently adequate quality for interpretation. These papers demonstrated a broad range of quality and confidence, both in favour and in opposition to the null hypothesis that neither BPS nor BPF have any adverse effects on human reproductive health. Several evidence streams were strongly lacking high quality data, marring any attempt to discern the potential human reproductive toxicities therein.

Conclusion

Our review concludes that BPS may have hazardous effects on human reproduction, pregnancy and ovarian health. Reproductive evidence streams addressing BPF were observed to be both quantitatively and qualitatively lacking. Overall, poor design, execution, and reporting of methodology was prevalent in the studies reviewed herein, undermining any serious attempt to discern the potential human hazards of BPS and BPF.

CAMERON GREENHALGH

A clinical audit of the stroke rehabilitation pathway in NHS Grampian.

Background

Stroke is a disease that is becoming increasingly more prevalent due to an ageing population and unhealthy lifestyle choices. The 2018 Scottish Stroke Improvement Programme (SSIP) identified NHS Grampian to be underperforming in several stroke targets therefore questioning the quality of stroke care in this area.

Methods

A clinical audit was undertaken focusing on the stroke patient pathway in NHS Grampian. The flow of the stroke patient pathway in NHS Grampian was assessed with particular interest in the length of stay (LOS) and discharge destination of patients in Stroke Rehabilitation Units (SRU). The differences between the SRU's at Woodend (W-SRU) and Fraserburgh (F-SRU) hospitals was assessed. The quality of the Six Simple Variables (SSV) score as a predictive indicator of stroke outcome was analysed. Analysis was undertaken on a dataset that included the information of stroke patients that had been admitted to NHS Grampian between 2011 – 2018. Differences between W-SRU and F-SRU and the value of the SSV score were assessed.

Results

Marked differences between the median LOS at W-SRU and F-SRU (51 v 30 days respectively) were exposed. A number of the six variables evaluated provided predictive indication in helping to predict a stroke patients LOS and discharge destination upon first hospital presentation. A total of 32 discharge delays occurred in W-SRU from September 2018 – February 2019.

Conclusion

The median LOS for patients at F-SRU is much shorter to that of W- SRU patients due to reasons such as better staffing and a greater number of therapy sessions. Elements of the SSV score were shown to be useful in helping to predict LOS and discharge delay. Discharge delays took place at W-SRU causing disruption to flow throughout the stroke pathway and resulted in accumulation of costs.

SCOTT GRIFFITHS

The development of a multicellular in vitro model for use in investigating the response of glioblastoma multiforme cells to therapeutic drugs.

Background

The benefits of culturing cells to form 3D spheroids have long been recognised, particularly for use as models in the preclinical testing of potential anti-cancer therapies. Compared to cell monolayers, spheroids retain more of the morphological and pathophysiological characteristics of tumours in vivo and better mimic their response to pharmaceutical agents. Despite this, technical and practical issues have limited the use of spheroids in industry. Glioblastoma multiforme is an aggressive malignancy that arises from glial cells in the central nervous system. Chemotherapeutic options are limited, rendering GBM a disease of unmet need. Advances to in vitro GBM models could improve our ability to identify effective novel therapies. This project aimed to develop a spheroidal model from a GBM cell line using a scalable technique which could be used in high-throughput screening.

Methods

Spheroids were formed using the liquid overlay technique and cells from the U373 glioblastoma cell line. Dose-response experiments were conducted to compare the responses of the model with those of a U373 monolayer to varying concentrations of the compounds paraquat and etoposide. Cell viability was measured using MTT and alamarBlue assays.

Results

The liquid overlay method was found to yield loose, irregular mass-shaped spheroids which were more resistant to the cytotoxic effects of paraquat than the cell monolayers. Etoposide had minimal effect on either form of cell model.

Conclusion

Whilst the U373 cell line did produce a high yield of spheroids, variability in size and shape meant that results lacked consistency. This would likely interfere with the suitability of the model for high-throughput screening, although may be improved through further optimisation of the technique. Spheroids remain a viable option to improve the preclinical testing of prospective drugs, however, further work is needed prior to the application of this model in industry.

EMMA LOUISE LEWIS

Exploring Scottish children's mental health using the ChiME dataset and understanding the influence of social characteristics.

Background

The aim of this study is to explore children's mental health for those who have moved house between preschool (age 4) and primary 3 (age 7) in Scotland compared to those who have not moved. The study will investigate if there is a difference in groups who move to a more deprived area in comparison to those who move to a more affluent area. The distance moved between the two age points will also be studied.

Methods

Using linked data from the Children's Mental health in Education (ChiME) study, changes in children's teacher-completed Strengths and Difficulties Questionnaire (SDQ) scores between age 4 and age 7 years were compared for children who had moved home with those who had not, taking into account area level deprivation using the Scottish Index of Multiple Deprivation data.

Results

Those children who relocated between age 4 and age 7 have increased Conduct Problem subscale scores after moving in comparison to their peers who do not relocate ($p=0.011$). This could be linked with risk factors for conduct problems known to be associated with relocating, such as family disruption and poor school achievement. There were no significant differences in change scores in relation to levels of deprivation moved or distance moved.

Conclusion

Children of families who move to a new house in the early primary school transition period may be at greater risk of mental health problems, specifically in terms of behaviour, and that education settings should be aware of the potential implications.

FIONA MACFARLANE

Characterising the Hormone Receptor Profile of Fibroblasts Derived from Male and Female Breast Cancers.

There has been increasing interest in the tumour microenvironment (TME) and its influence on tumour cells. The most abundant cells within the TME are cancer associated fibroblasts (CAFs) which are a spindle shaped heterogenous population of cells with no defined marker. It has been identified that CAFs promote tumorigenesis, drug resistance and metastasis and therefore could be an additional therapeutic target. Breast cancer is often classified by hormone receptor status. If hormone receptors are present endocrine therapies are a treatment option that prevent the activation of hormone receptors and tumour proliferation. As a result of this characterising the hormone receptor profile of CAFs may provide the first steps in identifying one mechanism by which CAFs can be inhibited. Therefore, this project aimed to characterise the expression of 3 steroid hormone receptors: oestrogen receptor (ER)-α, ER-β, androgen receptor (AR) and progesterone receptor (PR) in fibroblasts derived from male and female breast cancers compared to normal fibroblasts using immunofluorescence. Then to quantify this profile through ER-α, ER-β, AR and PR gene expression using real-time quantitative polymerase chain reaction (qPCR). Our results found that ER-α and ER-β were always expressed in normal fibroblast and CAF sets. AR was expressed in all female sets but absent in the male sets. PR was absent in all fibroblast sets. All 4 genes were present in the 9 sets of fibroblasts. ER-β and PR showed lower levels of expression whilst AR was most abundant. No clear difference in hormone receptor expression was observed between normal fibroblasts and CAFs. These findings suggest that there is hormone receptor expression in breast CAFs although it varies between different individuals. Further research is needed to characterise a greater number of CAFs and determine how endocrine therapies could be of therapeutic use when targeting CAFs in the TME.

REBECCA MACINNES

Endemic mycoses in children: histoplasmosis and blastomycosis.

Background

Blastomycosis and histoplasmosis are examples of endemic fungal infections, meaning they are confined to specific geographical regions. They are dimorphic, existing as a mould within the environment and transforming to a yeast when inhaled into the body. Primary systemic pathogens, they have the ability to disseminate through several organ systems resulting in severe, widespread infection. Knowledge surrounding these conditions currently relies on data taken from adult populations; little is known about how these conditions present in children.

Methods

The present study of childhood blastomycosis and histoplasmosis is a review of published cases from the year 2000 to current times. A literature search of PubMed was conducted and the epidemiological and clinical data from 150 cases was analysed.

Results

The mean age of presentation was 11.3 years ± 4.9 for blastomycosis and 9.5 years ± 5.5 for histoplasmosis. The majority of children presented with a disseminated disease or isolated pulmonary disease. 66.7% of histoplasmosis cases had some form of immunosuppression. Both infections presented with pulmonary features alongside non-specific systemic features including fever, myalgia, fatigue and weight-loss. Blastomycosis and histoplasmosis both carried a significant mortality rate (8.3% and 11% respectively).

Conclusion

Blastomycosis and histoplasmosis are deadly fungal infections that can infect children of any age. A lack of specific presenting features commonly leads to misdiagnosis resulting in significant morbidity and mortality. It is hoped that, with raised awareness, in the future, clinicians will consider blastomycosis or histoplasmosis as a differential diagnosis in children who present with non-specific pulmonary and systemic symptoms.

MOLLIE MACLEAN

The Effect of High-Intensity Interval Training on the Economy of Steady-State Exercise, Maximum Oxygen Uptake, Exercise Capacity and Heart Rate Recovery.

Background

To our knowledge no study has been conducted into examining the effect of high-intensity interval training (HIT) on the economy of steady-state exercise using total oxygen consumption as the primary measure.

Methods

We examined changes in oxygen consumption during a steady-state test before and after 3 weeks of HIT. We also looked at the effect of HIT on maximum oxygen uptake (VO_2max), exercise capacity and heart rate recovery (HRR). Nine physically active female students (21 ± 1 years, VO_2max = 35.9 ± 1.3 ml kg-1 min-1) participated in the study and performed 9 sprint interval training sessions on a cycle ergometer over 3 weeks. Each session consisted of 4-6 repeats of 20s 'all out' cycling with 3 minutes of recovery between intervals.

Results

We found no change in total oxygen consumption measured during a 20-minute steady-state test post-training (1339.9 ± 53.1 vs 1371.8 ± 73.4 ml/min; $P<0.05$). Training increased VO2max by 13.7% (35.9 ± 1.3 vs 40.5 ± 1.3 ml/min/kg; $P<0.05$) and increased time until volitional exhaustion during an incremental test by 13.3% (406 ± 29 vs 455 ± 26 seconds; $P<0.05$). Peak power output measured during the training increased by 19.4% (627.8 ± 47.1 vs 749.7 ± 29.7 watts; $P<0.05$) from the 1st to the 9th session. There was no change in peak or average heart rate during an incremental and a steady-state test post training, however we found a 47.7% increase in HRR from the 1st to the 9th training (14.6 ± 1.8 vs 21.5 ± 2.7 bpm; $P<0.05$).

Conclusion

These data demonstrate that 3 weeks of HIT is an effective stimulus for increasing aerobic capacity, anaerobic power and heart rate recovery however it had no effect on exercise economy.

JOANNE MARTIN

Early life socioeconomic status and later life brain health: Aberdeen 1950's cohort

Background

Socio-economic status (SES) is a hierarchical social classification most influenced by occupation, income, social class and education. Large healthcare disparities exist between individuals of differing SES. Early life SES (elSES) has been shown to increase the incidence of a range of different medical conditions and has been associated with various structural brain changes in later life. These include a reduction in the size of the hippocampus, amygdala and anterior cingulate cortex. White matter hyperintensities (WMHs) are markers of neurovascular damage and have been linked to parental occupation. Education has been shown to be somewhat protective in the development of WMHs.

Methods

ElSES variables (n=62) were condensed using principal component analysis (PCA) in the following four categories: parental characteristics, birth/neonatal factors, household indicators and early life education. MRI and cognitive function testing was conducted between 2015-2017 at the University of Aberdeen. The volumetric imaging data and cognitive function scores were correlated with elSES features for participants (base line and regression to account for later life socioeconomic status and current health).

Results

Hippocampal and amygdala volume were reduced in those who had experienced early life adversity in the birth and neonatal category. No other elSES category appeared to influence the volume of any brain structure. Current alcohol intake was also associated with a smaller amygdala. WMH volume was not influenced by elSES. Adversity in early life education significantly influenced later life cognitive function. Those experiencing the least adversity in this category had the greatest cognitive function.

Conclusion

Later life brain structure and function is influenced by a range of elSES variables and the effects appear to be multidimensional. There are clear links between the structural and functional measurements which may suggest that the decline in function that is seen, is a result of the reduction in brain volume.

DYLAN MCCLURG

Assessing therapeutic vulnerability in model systems of oesophageal adenocarcinoma.

Background

There is a rising incidence of oesophageal adenocarcinoma (OAC), a main subtype of oesophageal cancer, which carries a poor 5-year survival rate of <15%. Currently OAC patients, dependent on their staging, undergo similar standards of care such as chemotherapy with or without radiotherapy followed by surgery. However, with limited therapeutic options and our increasing knowledge of the genomic heterogeneity of OAC, a 'one size fits all' approach is no longer tenable. Recently as part of the International Cancer Genome Consortium the Fitzgerald laboratory has characterised the driver gene landscape for this disease [1]. In addition, with increasing evidence that the tumour microenvironment (TME) plays an important role in OAC progression and survival, a greater understanding of the TME composition at each stage of tumour development and in each OAC subtype will provide new potential precision medicine opportunities.

Therefore, the aims of this project are to test new compounds in organoid culture models which reflect the morphological, functional and genomic features of the primary tissue.

Methods

Oesophageal organoids will be selected based on their molecular and phenotypic features and components of the immune environment will be introduced to mimic the in vivo environment. Promising compounds from a drug screening project in 2D cell lines will then be tested in the relevant 3D organoids to identify the most promising candidates. Assays will include measures of cell kinetics, polarity and invasion.

Expected Outcomes

A more accurate in vivo model of the primary tissue will be developed that includes components of the immune environment. Novel potential therapeutics for OAC will be identified through the testing of new compounds in this model system.

CRAIG OSBORNE

Effectiveness of simulation-based cardiac auscultation education: a systematic review and meta-analysis

Background

Research suggests that simulation-based medical education (SBME) can benefit teaching cardiac auscultation. This systematic review aimed to address the gap in the literature regarding the effectiveness of SBME in cardiac auscultation training for healthcare professionals within randomised controlled trials (RCTs).

Methods

Literature searches were performed on Medline, Embase, PsychInfo and Cinahl. RCTs that compared the effectiveness of high-fidelity SBME against usual teaching or another form of SBME in teaching cardiac auscultation to healthcare trainees were included. Outcomes were knowledge, skills and satisfaction relating to cardiac auscultation education. Data were analysed using Review Manager 5.3 software.

Results

15 RCTs (n=913) were included in this review. 10 RCTs (n=550) compared SBME with usual teaching. The pooled effect sizes for knowledge and skills respectively were 1.04 (95%CI 0.78–1.29; $p < 0.00001$) and -0.72 (95%CI -1.97–0.52; p=0.26). 5 RCTs (n=363) compared high-fidelity SBME with another active teaching intervention using SBME. The pooled effect sizes for knowledge and skills respectively were - 0.73 (95%CI -1.99–0.53; p=0.26) and 0.32 (95%CI -0.75–1.39; p=0.56).

Conclusion

SBME resulted in significantly better knowledge than no intervention. There was no significant difference in knowledge or skills when comparing SBME to another active teaching intervention using SBME. Further research is needed to establish the effectiveness of different forms of SBME as educational interventions.

ELLEN PARKINSON

The impact of policy on childhood obesity rates in the developed world.

Background

Policy plays a vital role in curbing the current upward trajectory of childhood obesity in the developed world. The present paper aims to identify which policies may have had an effect on childhood obesity rates and therefore how best different components of policy can be used to tackle childhood obesity.

Methods

This is a secondary data analysis review. Policies were retrieved from systematic searches of government websites and general internet searches using key search terms. Data from policies and childhood obesity incidence data was retrieved and analysed to determine which components of policies were most effective in reducing childhood obesity.
Policies with a childhood obesity focus, between 1990 and 2016, in ten developed countries – Scotland, England, Ireland, Denmark, Sweden, Latvia, Malta, Australia, New Zealand and Japan.

Results

Fifty-four policies from the ten countries were analysed. One country had a decreasing trajectory of childhood obesity; four had a levelling out trajectory; four had a decreasing trajectory and one had a trajectory which was unable to be determined. The most common strategy in policies was that which combined both Diet and Physical Activity. The target settings of policies varied with the most common setting being a Community setting. The number of policies implemented in the countries varied between two and eleven.

Conclusion

There were varying strategies used between policies with the most effective policies appearing to be those with both a unilateral focus (Diet or Physical Activity alone) and setting (Community – including home).

MARY-BETH PATTERSON

Using media campaigns to encourage engagement with health research; what works?

Background

Poor recruitment and retention to clinical trials are recognised as barriers to clinical research. Poor public knowledge of health research is a contributing factor. The Health Service Research Unit (HSRU) aims to undertake a media campaign to improve health research engagement. Evidence has shown that mass media campaigns are effective at disseminating information and changing health behaviours. Our aim is to gather information from experts responsible for designing, developing and implementing mass media campaigns to inform the design of future public awareness campaigns aiming to improve engagement with health research.

Methods

Semi-structured interviews (n=18) with experts involved in the design, development and implementation of mass media campaign, were audio recorded, transcribed and analysed using the Framework method.

Results

Four themes were identified within the study: planning a campaign, campaign content, communication methods and evaluation. The study highlights the importance of identifying campaign objectives by working within a multidisciplinary team and understanding the target audience. This ensures that campaign content and communication methods chosen, align with the target audience. This can be achieved through target audience co-design, audience research and pre-market testing. The study found that evaluation is essential to refine and learn lessons for future campaigns. However, this can be challenging, especially when measuring behaviour change.

Conclusion

Focused campaign objective setting and a multidisciplinary approach to campaign planning is a key recommendation that should be adopted when planning a public awareness campaign. Understanding the target audience is essential and campaigns aiming to improve health research engagement should address barriers preventing engagement. Further research is required to assess the most effective method of evaluating a mass media campaign that attempts to increase health research engagement. The findings of this study should assist in the development of future public awareness campaign that aim to encourage engagement with health research.

BEN RODDY

PPI's and Polypharmacy – A Hard Pill to Swallow Utilizing an educational intervention to enhance PPI prescribing methods and reduce polypharmacy in General Practice

Background

Polypharmacy is a growing issue in the UK with many complications associated with it, PPIs (proton pump inhibitors) are a contributing factor as they are common medications prescribed in the elderly population. Many complications are associated with long term PPI use and deprescribing is one approach to reduce both of these issues. An NHS Scotland publication (National Therapeutic Index) identified NHS Fife as above the national average in relation to PPI prescriptions.

Methods

Consisted of a 2-cycle audit that took place between 17th January and 7th March 2019, with a two-pronged educational intervention taking place on 6th February 2019. Both cycles analysed the same criteria including proportion of over 75 population prescribed a PPI and prevalence of polypharmacy (>5 medications). The intervention consisted of a presentation involving 2 video consultations and a PPI deprescribing algorithm being distributed. 2 surveys were circulated, one focussing on perspectives regarding PPIs and polypharmacy and the other providing feedback on the intervention itself.

Results

Pre-intervention % of over 75s on a PPI was 32.6% and post-intervention it was 32.7%. Pre-intervention proportion of over 75s on >5 medications was 89.8% compared to post-intervention figure of 89.7% but neither change was statistically significant (at $p<0.05$). Both aspects of the intervention were well received with the presentation getting a mean score of 9.2 and the algorithm receiving 9.3.

Conclusion

Polypharmacy is a growing issue in the UK with inappropriate PPI prescriptions contributing to the problem. While the intervention was ultimately ineffective, this was largely due to timing issues. There would be value in repeating this audit in the future, implementing recommendations leading to a more extensive and complete study.

MOHAMMED FAIZAN

"Your womb, your choice!" Timing of pregnancy following miscarriage; what do women think?

The topic of the ideal interpregnancy interval following a miscarriage is accompanied by a great deal of controversy, due to the fact that the WHO guidelines advise women to delay pregnancy for 6 months following a miscarriage. However, this guidance was based on a single study done in Latin America, which had multiple methodological weaknesses. Following this, research carried out, including a systematic review, found that a short interpregnancy interval (less than 6 months) following miscarriage is beneficial in terms of outcomes.(Kangatharan et al, 2016) However, the impact of this on couples/women in this predicament is unknown. Therefore to address the knowledge gap, this research study was designed to evaluate the views, attitudes and beliefs of women on the ideal interpregnancy interval following miscarriage.

The research project consisted of a literature review to establish baseline knowledge regarding the research and guidelines published around the topic thus far. There was no evidence discovered regarding the outlook of women/couples on the ideal interpregnancy interval following miscarriage. Therefore, the community level beliefs of women were evaluated and analysed using a thematic analysis framework of discussion threads from a popular online forum, Mumsnet.

The results of the qualitative research of the online threads portrayed that women overwhelmingly believe that there is no need to wait in attempting to conceive again following a miscarriage and the principal conclusion being that one should try and conceive again once they feel ready. Women displayed their frustration at the multiple sources of conflicting advice they were receiving as well as the belief that being told to wait before trying to conceive was advice based on traditional practices.

The results of this study contribute to addressing the gap in knowledge, regarding women's beliefs on the ideal interpregnancy interval and inform the requirement of further research to be conducted and revision of the WHO guidelines.

GABRIELLE SLATER

You decide: Eat to forget or remember

The prevalence of Alzheimer's Disease (AD) in the UK is a major health concern. This disease affects men and women globally and is defined by the presence of Ab and Tau inclusions and microglia-dominated neuroinflammation within the cerebral cortex which leads to neurodegeneration. This wrongful accumulation of proteins is accountable for the common deleterious phenomena such as progressive memory loss, decreased judgement, and reasoning along with behavioural and psychiatric symptoms. Alzheimer's Disease (AD) is associated with non- modifiable risk factors, it is known to accelerate with age and some patients have a genetic predisposition. There are, however, modifiable risks factors for Alzheimer's Disease one of which includes dietary risk factors. Whilst Acetylcholinesterase inhibitors and N-methyl aspartate receptor antagonists (Memantine) remain the only proven symptom reduction therapy, evidence shows that there may also be a role for nutritional modification in Alzheimer's Disease management. The aim of this literature review is to first explore the complex mechanisms behind the cause of cognitive decline in Alzheimer's Disease and then to determine where diet may pose as risk factors or offer benefits to the neurodegenerative disease.

AD may not be a disease in its own right, although, it is a type of dementia with complex mechanisms, the dietary link and association of AD with other conditions such as obesity and diabetes suggest that it could actually be the end result of poor diet. This review highlighted how different diets can have various different effects on AD phenotypes. A western style diet, obesity and Type 2 diabetes (which can be a consequence of a calorie excess) can all increase the risk of developing AD. Contrary to this, consumption of food sources with antioxidant and anti-inflammatory properties, such as pomegranates and food types capable of lowering homocysteine levels, may be seen to reduce the risk of developing AD. Therefore, the future therapeutics to the disease may be a targeted dietary approach involving a calorie restriction, a diet low in fat and low in sugar, and increasing consumption of pomegranates and homocysteine reducing foods all reduce the risk of AD. By identifying dietary risk factors and adjusting what we eat before we reach 'cognitive aging,' this may prevent or halt the disease progression and improve cognitive and learning performance.

AUTHOR INDEX

FURTHER YOUR ACADEMIC INTEREST

Below is a selection of useful organisations and websites to help further your interest in academic medicine as a student.

Aberdeen Student Society for Academic Medicine (ASSAM)

"The Aberdeen Student Society for Academic Medicine (ASSAM) was established in 2012 with the hope to encourage undergraduate interest in medical research. Even though their primary aim is to inspire medical students to pursue a career in academia, they also try to highlight the importance of basic research skills and critical appraisal in normal clinical practice. "

www.assam.nsamr.org | assam@nsamr.ac.uk | Facebook: AberdeenASSAM

Aberdeen Clinical Academic Training (ACAT)

Training programmes and support for postgraduate clinicians in Aberdeen.

www.abdn.ac.uk/smmsn/acat

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DESIGNED BY - Jesus Perdomo

www.abdn.ac.uk