



# SUMMER RESEARCH SCHOLARSHIPS SYMPOSIUM

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22 NOV 2023



UNIVERSITY OF  
ABERDEEN



## PROGRAMME

**14:15-14:30** POSTER VIEWING

**14:30-14:35** PROFESSOR SILADITYA BHATTACHARYA

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### SESSION 1 ASRS & HENDERSON GLOBAL MEDICAL SCHOLARSHIP

**14:35-14:45** ANDRÉ JUSTIN CARPIO

**14:45-14:55** ANGUS SHORTHOUSE

**14:55-15:05** ANNA MILLS

**15:05-15:15** MAX MCALLAN

**15:15- 15:25** RHEURE ALVES-LOPES

**15.25-16.15** POSTER VIEWING AND REFRESHMENTS

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### SESSION 2 ENDOWED SCHOLARSHIP SCHEMES & SURGANAT

**16:15-16:25** EMMA MACRAE

**16:25-16:35** JUSTYNA KACZMAREK

**16:35-16:45** ROSA THUEMMLER

**16:45-16:55** NATTHAYA EIAMAMPAI

**16:55-17:05** THOMAS DIFFLEY

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**17:05-17:35** JUDGES DISCUSSION

**17:35-17:50** ASRS PRIZES & CLOSING REMARKS

**17:50-18:30** REFRESHMENTS





## ACKNOWLEDGEMENT

This abstract booklet contains an inspiring collection of abstracts from a diverse range of research projects carried out by summer research scholarship students both at the University of Aberdeen and at prestigious external Universities.

The University would like to thank the Academy of Medical Sciences which provides INSPIRE funding to support the valuable work carried out by our students. This essential funding stream supports our national, international, and interdisciplinary scholarships. We would also like to thank the generous support of the Development Trust and our endowment funders who have committed to supporting research scholarship for our students.

I would personally like to thank the students for their commitment and dedication as well as their supervisors who give so generously of their time and expertise. I would like to acknowledge the significant contribution from the Aberdeen Student Society for Academic Medicine who designed this abstract booklet as well as their tireless outreach work and enthusiasm for academia. I would also like to thank Ryan Watson who has taken on the administration of the programme and done a stellar job . I would finally like to thanks Prof Val Speirs who has made a significant contribution to the ASRS over many years and will be stepping down from her role on the executive.

## PROF COLIN J LUMSDEN

INSPIRE LEAD

LEAD OF THE MBCHB



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# SEX AND ETHNIC DISPARITIES IN PATIENTS WITH HEART FAILURE AND ACUTE ISCHAEMIC STROKE

ALI L AL-BATAT

## BACKGROUND

Heart failure (HF) is becoming a leading cause of death and hospitalisations. Previous studies using the United States National Inpatient Sample (NIS) found revascularisation of HF patients with acute ischaemic stroke (AIS) was effective in reducing in-hospital mortality. However, these did not examine sex and ethnic differences between patients. We therefore sought to determine the sex and ethnic differences in the association between comorbid HF and acute ischaemic stroke treatments and in-hospital outcomes in patients with HF using data from the NIS..

## METHOD

AIS admissions between January 2016-December 2019 were included. Logistic regressions analysed the relationships between patients with and without HF and outcomes included in the study (in-hospital mortality, median length of stay (LoS) >4 days, thrombectomy, thrombolysis and discharge destination). Models including interaction terms with sex and ethnicity were constructed to explore these disparities. All models were adjusted for age and pre-existing comorbidities.

## RESULTS

348,878 records representative of 1,744,390 hospitalisations were included. There were 16.36% HF patients (67.07% White, 21.59% Black, 6.47% Hispanic, 2.10% Asian/Pacific Islander). HF was associated with higher odds of mortality (odds ratio (95% confidence interval) = 1.06 (1.00-1.12)), LoS (1.32 (1.30-1.35)) and lower odds of routine home discharge (0.77 (0.57-1.03)). There were no significant sex differences in mortality or LoS. The

association between HF and routine discharge was lower in women (0.73 (0.70-0.76)) than in men (0.85 (0.82-0.87)). The association between HF and mortality and routine discharge was significantly worse in whites than in ethnic minority patients. Patients of minority ethnic groups were more likely to receive revascularisation treatments than those of white patients.

## CONCLUSIONS

The associations between HF and adverse AIS outcomes were stronger in women and white patients. This study has shown that race and sex differences can impact revascularisation treatments in HF patients. Further research is required to identify the main drivers of these disparities to address them.

**SUPERVISORS:** Dr Tiberiu A Pana, Prof Mamas A Mamas, Prof Phyo K Myint

**FUNDED BY:** Professor Gwyn Seymour Research Scholarship; Department of Medicine for the Elderly, NHS Grampian Charity Fund (GCA23032).



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# **PREDICTING DIFFICULT LARYNGEAL EXPOSURE (DLE) DURING OPERATIVE MICROLARYNGOSCOPY: EVALUATING THE PREDICTIVE VALUE OF LARYNGOSCORE IN A SINGLE CENTRE UK POPULATION IN A SCOTTISH TEACHING HOSPITAL**

**ALISHAH HAIDER**

## **BACKGROUND**

Microlaryngoscopy is an operation performed under general anaesthetic to look at the larynx, take a biopsy for diagnosis or treat laryngeal cancer. The Laryngoscore is a pre-operative predictor of laryngeal exposure. It consists of 11 parameters and enables the surgeon to ensure the success of the operation beforehand. Good laryngeal exposure is dependent on how well the anterior commissure can be seen. The anterior commissure of the larynx is the junction point at which the true vocal cords can be seen.

## **METHODS**

356 patients undergoing elective Microlaryngoscopy were assessed pre-operatively using a standardised assessment protocol called the Laryngoscore. The Laryngoscore measures 11 parameters and patients are given a score out of 17. Based on the score the patients were categorised into five classes (Class I to Class IV) that were based on the anterior commissure (AC) visualisation to distinguish between good and difficult laryngeal exposure; where Class I–II were identified to be Good Laryngeal Exposure (GLE) and Class III–IV were identified to be Difficult Laryngeal Exposure (DLE).





## RESULTS

The mean score for GLE was calculated to be below 5, therefore this was taken as the cut-off point to predict DLE. When the Laryngoscore was  $<5$ , GLE was observed in 71.1% of our patient population.

## CONCLUSIONS

Laryngoscore is a good predictor for difficult laryngeal exposure. This information can help clinicians during surgical planning and patient counselling pre-operatively to evaluate if surgery is possible. Additionally, if difficult laryngoscopy can be predicted, the surgical team can anticipate the appropriate instruments required which ensures patients safety and positive outcomes for patients as well.

**SUPERVISORS:** Mr Muhammad Shakeel

**FUNDED BY:** The Innes Will Scholarship

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# ASSESSING THE POTENTIAL OF ESCAPE ROOMS IN MEDICAL TEACHING

ANDRÉ JUSTIN CARPIO

## BACKGROUND

Escape rooms, which involve participants completing puzzles to escape a room, are increasingly being used in medical education. While currently most medical escape rooms are used to reinforce previously studied material, this project assessed if escape rooms can teach new content. Health impacts of climate change are sparse in the medical curriculum, making it an ideal escape room theme to assess the study question.

## METHODS

OVID and PubMed were used to find papers detailing the impacts of climate change on the cardiovascular and respiratory systems. Learning outcomes were created and mapped to various puzzle types. Various tools were used to host the puzzles on a website, which was circulated to medical students in Aberdeen. Pre/post activity questionnaires assessed knowledge, interest levels, and other metrics. A second iteration of the escape room with a standalone questionnaire was conducted during the first-year induction week.

## RESULTS

Participants from both versions of the escape room who answered the questionnaire (n1=23, n2=66) reported an increase in self-assessed knowledge after the activity. The majority agreed that escape rooms could effectively teach new content (91.3%, 78.8%) and should be used in medical education (91.3%, 91%). Stronger levels of agreement were found in the first escape room. Specific to the second escape room, 48.5% of students



strongly agreed that this activity was an excellent icebreaker. There was little negative feedback, but a recurring theme was the difficulty in learning under time pressure (30.4%, 16.7%). Except for a few technical issues, no other negative feedback was reported.

## CONCLUSIONS

Virtual escape rooms are an engaging and enjoyable pedagogical medium which can teach new content to medical students. Further implementation in the medical curriculum should be considered.

**SUPERVISORS:** Dr. Silvia Mazzotta and Dr. Catriona Cunningham

**FUNDED BY:** Aberdeen Summer Research Scholarship



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# ASSESSING THE RELATIONSHIP BETWEEN EARLY LIFE STRESS AND NEURODEGENERATION: A SYSTEMATIC REVIEW AND META-ANALYSIS

ANGUS D. SHORTHOUSE

## BACKGROUND

Parkinson's Disease (PD), Amyotrophic Lateral Sclerosis (ALS) and Alzheimer's Disease (AD) affect 11.7% of individuals above the age of 65. They collectively share hallmark characteristics of protein aggregation and progressive loss of nerve cell structure and function. Which, in an ageing population, carries a significant burden on both the individual and the community. Several studies have indicated that early life stress (ELS) may increase the incidence of neurodegenerative conditions. The purpose of this review and meta-analysis was to evaluate the physiological changes caused by ELS and their links to neurodegenerative disease.

## METHODS

A priori protocol was published (<https://www.protocols.io/private/797679561B2411EEAFD80A58A9FEAC02>) and searches were performed on Pubmed and Medline & Embase to identify potential studies for data extraction. Papers were deduplicated and then screened against an inclusion & exclusion criteria. If a study was applicable to the review, individual outcomes as well as data related to the type & timing of the ELS was retrieved. Where three or more studies had assessed the same quantitative variable, a meta-analysis was performed alongside a heterogeneity assessment.

## RESULTS

51 out of 774 studies were suitable for data extraction. Numerical outcomes were then categorised into biochemical, phenotypic, and histological subsets. In ELS individuals, there was a significant increase in

lipid peroxidation, A $\beta$ 42, total tau levels, caspase-3 and amyloid plaque deposition relative to non-ELS controls. Impaired limb use in PD mice, dopamine, neuronal cell counts, and ChAT fibres were significantly decreased in ELS exposure groups. No significant differences were found for  $\alpha$ -synuclein, A $\beta$ 40 levels, and hippocampal amyloid plaque deposition.

## CONCLUSIONS

Lipid peroxidation is elevated in ELS individuals and is a known molecular pathway in the pathogenesis of several neurodegenerative diseases. In light of this review and in order to mitigate disease risk, there is now an added emphasis on the development of protective antioxidants.

**SUPERVISORS:** Jenna M. Gregory and Fergal M. Waldron

**FUNDED BY:** An Aberdeen Summer Research Scholarship (ASRS) to ADS, a Royal Society grant to JMG (RGS\R1\221396) and Target ALS Foundation grant to JMG and FMW (BB-2022-C4-L2).



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# STROKE PUBLICATION PATTERNS BY COUNTRY, POPULATIONS, STROKE INCIDENCE AND GDP FROM 2011 TO 2022

ANNA T MILLS

## BACKGROUND

To determine the pattern of contributions from each country in published stroke research during preCOVID (2011-01-01 to 2019-12-31) and COVID (2020-01-01 to 2022-12-31).

## METHODS

Bibliographic data was extracted from Web of Science. Author fractions (AF) and citation fractions (CF) were calculated with Bibexcel. These were compared by country to GDP, population and stroke incidence (SI). Country collaborations were visualised using VOSviewer.

## RESULTS

87993 papers were assessed preCOVID and 48520 during COVID.

- USA had the highest number of AF (% total) 2011-19 at 24%, China 12%, Japan 7%, Germany 6%, South Korea 5%. From 2020, China was highest at 23%, USA 20%, Japan 6%, Germany 5%, South Korea 5%. In the top 10 preCOVID, output then increased >100% in: China 453%, South Korea 101% and Taiwan 123%.
- Top 5 CF (% total) 2011-19 were USA 32%, China 7%, Germany 7%, England 6% and Canada 5%. CF was associated with GDP:  $R=0.927, p<0.001$ .
- 2020-22: USA 25%, China 21%, Germany 5%, England 5% and Italy 5%. CF was associated with GDP:  $R=0.81, p<0.001$ .

- Comparing AF to GDP 2011-19 ( $R=0.971, p<0.001$ ). AF/GDP ratio: Serbia, Taiwan, Denmark, Netherlands and Greece were top. Total AF per capita  $R=0.212, p<0.006$ : Top 5 Denmark, Sweden, Switzerland, Netherlands and Scotland. AF was associated with SI ( $R=0.47, p<0.001$ ), but not SI per capita.
- Comparing AF to GDP 2020-22 ( $R=0.964, p<0.001$ ). AF/GDP ratio: Taiwan, Grenada, Greece, Lebanon & South Korea were top. Top 5 total AF per capita ( $R=0.611, p<0.001$ ): Denmark, Switzerland, Sweden, Netherlands and Taiwan. AF was associated with SI ( $R=0.751, p<0.001$ ), but not SI per capita.
- Collaborations assessed by total link strength 2011-19, top 3: USA, England, Germany. 2020-22: USA, England, Germany.

## CONCLUSIONS

Total AF per country was associated with GDP, but less so with GDP/capita. Countries with lower GDP had lower AF, CF and fewer collaborative links. AF was associated with SI, but not SI/capita.

**SUPERVISOR:** Professor Mary J MacLeod

**FUNDED BY:** Aberdeen Summer Research Scholarship



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# **A SYSTEMATIC REVIEW OF THE LITERATURE DESCRIBING THE RELATIONSHIP BETWEEN CHRONIC HEALTH CONDITIONS IN CHILDHOOD AND ECONOMIC PRODUCTIVITY AS AN ADULT**

**ANSU MARI SAJI**

## **BACKGROUND**

Poor mental health in adolescence, is associated with decreased earnings and increased dependence on benefits in adulthood. The relationship between poor physical health in childhood and economic status in adulthood is less understood. This review was designed to describe the relationship between chronic mental and physical conditions in childhood and economic productivity in adulthood.

## **METHOD**

We adapted the search strategy previously used by Hale et al. (2015) to identify literature published from 2014. Searches were conducted across 13 databases exploring markers of adult economic productivity in those with chronic health conditions in childhood (aged less than 18 years) compared to those without. Chronic condition was defined as “any long-term health condition of clinical or diagnosable severity, including chronic physical illness or mental health disorder assessed aged less than 18 years”. CASP checklist was used to assess the quality of studies included.

## **RESULTS**

A total of 10, 823 titles and abstracts were screened by two independent researchers. 136 full texts were reviewed of whom 51 studies were included.



The majority of studies assessed adolescent mental health which was associated with reduced income and increased health, social care and criminal justice costs in adulthood. ADHD was associated with reduction in employment and earnings and increase in social assistance in later life. Childhood cancer was linked to higher mean sickness absence, disability pension and treatment induced hearing loss in adulthood. Chronic medical conditions such as rheumatoid and congenital heart disease were associated with decreased employment rate. Physical disability was related to lower levels of education and unemployment.

## CONCLUSION

Chronic childhood mental and physical conditions are associated with adverse economic outcomes in adulthood. These findings provide evidence for investment in children and young people with physical and mental health conditions in order to increase productivity in the workplace and reduce welfare dependence in adulthood.

**SUPERVISORS:** Smita Dick, Lok Hei Christy Chan, Chun Wai Chik, Katarzyna Lucka, Steve Turner

**FUNDED BY:** Innes Will Scholarship



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# CRITICAL APPRAISAL OF SYSTEMATIC REVIEWS CROSS-REFERENCED IN EAU GUIDELINES ON PROSTATE CANCER 2023

AQEEL ALEBRAHEEM

## BACKGROUND

Clinical practice guidelines are a crucial aid to decision-making in healthcare settings. As such, they should be based on high-quality evidence. To produce high-quality evidence, systematic reviews integrate and appraise multiple studies' results, playing a crucial role in evidence synthesis. The quality of systematic reviews can be assessed using particular tools such as AMSTAR 2 (A MeaSurement Tool to Assess systematic Review). We utilised the AMSTAR 2 tool to critically appraise systematic reviews of intervention effectiveness published in 2022 and cross-referenced in the EAU Guidelines on Prostate Cancer 2023 to assess the quality of the systematic reviews underpinning the guideline's recommendations.

## METHODS

The references list of the EAU Guidelines on Prostate Cancer 2023 was screened for systematic reviews. Systematic reviews were assessed for eligibility based on the inclusion criteria. Systematic reviews were considered eligible if they were interventional and published in 2022. Eligible reviews were critically appraised using the 16 items composing the AMSTAR 2 tool. The confidence in the results, and thus the quality, of each systematic review was determined based on the score in each item and the item's criticality.

## RESULTS

9 of the guideline's 1489 references were eligible for inclusion. Based on the interpretation of the AMSTAR 2 results, 5 systematic reviews (55.56%) were of critically low quality. 3 systematic reviews (33.33%) were of low quality. Only 1 systematic review (11.11%) was of moderate quality and no systematic reviews were of high quality.

## CONCLUSIONS

Our assessment of the quality of systematic reviews using AMSTAR 2 indicated that the results of eligible systematic reviews were of generally low or critically low quality. Therefore, we believe it is necessary to perform a more inclusive assessment that reflects the quality of systematic reviews underpinning the recommendations of the EAU Guidelines on Prostate Cancer 2023.

**SUPERVISORS:** Dr. Imran Omar

**FUNDED BY:** Aberdeen Summer Research Scholarship (ASRS)

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# INVESTIGATING PATTERNS IN CLINICAL PHENOTYPES OF ACUTE ISCHEMIC STROKE PATIENTS AND ITS IMPACT ON PATIENT MORTALITY IN THAILAND; A LATENT CLASS ANALYSIS

CAROLINE ROICE

## BACKGROUND

Stroke was the second leading cause of all deaths and disability in Thailand in 2019. Previous research investigating risk factors of stroke has identified several individual comorbidities and lifestyle factors such as smoking for adverse stroke outcomes. Similarly, high comorbidity burden is also strongly associated with stroke mortality. Such previous analyses do not account for comorbidity clustering within different patient phenotypes. We therefore aimed to use latent class analysis (LCA) to determine the real-life acute ischaemic stroke (AIS) comorbidity clusters using a patient sample from Thailand in an attempt to derive prognostically useful information in the era of personalised medicine. Latent class analysis (LCA) is a form of unsupervised machine learning which can identify hidden comorbidity patterns using a probabilistic modelling algorithm.

## METHODS

500,233 AIS patients admitted to public hospitals in Thailand between 2004 to 2017 were extracted from the Thai National Public Insurance Dataset. Prevalent comorbidities were identified using ICD-10 codes. Descriptive statistics and LCA were performed separately by sex in R version 4.3.1, using the polCA, dplyr and stringr package.

## RESULTS

LCA identified 24 different clusters for both sexes, out of which there 6 significant groups for females and 5 for males. Women had a wider range of comorbidities than men resulting in certain differences. For example, women had differences in the heart failure grouping and an additional cluster with Cerebrovascular Accidents and episodic/paroxysmal disorders. There were similarities between sexes for example, metabolic syndrome(MetS), anaemia and acute kidney injury were often together in clusters. Respiratory failure and pneumonia were together in almost every trial/cluster. The rheumatic heart diseases were significantly more common in younger patients..

## CONCLUSION

Preliminary results indicate significant differences between sexes and age, and correlations between certain unusual comorbidities including AKI and gout, and sepsis and MetS.

**SUPERVISORS:** Dr Tiberiu Pana, Professor Phyo Myint

**FUNDED BY:** Aberdeen Summer Research Scholarship

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# INVESTIGATING THE ROLE OF BRAIN IRON ACCUMULATION IN THE PATHOGENESIS OF PARKINSON'S DISEASE USING DEEPLY CLINICALLY PHENOTYPED POST-MORTEM TISSUE

CHRISTINE ADDAE-KYEREME

## BACKGROUND

The pathological hallmark of Parkinson's Disease (PD) is the aggregation of a protein called  $\alpha$ -synuclein. Whilst all people with PD share this key neuropathological hallmark, clinically PD is a heterogenous disease with individuals experiencing a range of clinical manifestations including variable cognitive presentations. The reason underlying differential susceptibilities to cognitive decline in people with PD is poorly understood. Recently it has been postulated that  $\alpha$ -synuclein aggregation could be associated with aberrant iron accumulation. Here we test the hypothesis that brain iron accumulation is associated with cognitive decline (CD) in PD.

## METHODS

We selected deeply clinically phenotyped post-mortem cases from the PINE (Parkinson's in the Northeast) study, stratifying cases according to the presence or absence of CD. Cases were sub-divided into the following categories: PD-CD (n=3), PD+CD (n=3) and non-PD controls (n=3). From whole-fixed brains I collected tissue from the midbrain and the motor cortex, hypothesising that these regions would be the most affected by iron accumulation. The tissue was then processed into formalin fixed paraffin embedded blocks, which I sectioned and stained with markers of iron accumulation (ferritin) and a potentially protective regulator of ferroptosis (GPX4).

## RESULTS

We identified an increase in ferritin immunoreactivity (iron accumulation) within neurons and glial cells from patients with PD when compared to the non-PD controls. Digital analysis of DAB intensity for Ferritin and GPX4 staining in PD+CD and Healthy controls demonstrated two distinct groups, with PD-CD on a spectrum encompassing both groups. This indicates that it may be possible to stratify those at risk of dementia by understanding these pathways in more detail.

## CONCLUSIONS

This work plays a key role in examining the relationship between iron deposition and clinical phenotype in PD. Our data imply that iron accumulation could predict clinical outcome raising the possibility of biomarker development and therapeutic targeting.

**SUPERVISORS/COLLABORATORS:** Dr Holly Spence, Dr Fergal M. Waldron, Dr Fiona Read and Dr Jenna M. Gregory

**FUNDED BY:** Flow Gow Murray Neuroscience Scholarship



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# SUSTAINABILITY CONSIDERATIONS FOR PATIENT'S ATTENDING FOR DENTAL EXTRACTIONS

**DOBROCHNA PSZENNA**

## BACKGROUND

When considering the environmental impact of dentistry the most significant component comes from patients travelling to attend their dental appointments [Duane et. al. 2017]. It has been suggested that patients do consider the environment when undergoing dental treatment but may not be prepared to make changes that could risk their health [Baird et. al. 2022].

Extractions are some of the most invasive procedures dental patients will undergo during their treatment but there is currently no information on whether patients even consider environmental factors when attending for their appointments. This study will provide important data on patient's attitudes to environmental issues in a clinical scenario where their health may potentially be most compromised by the changes necessary for more sustainable dentistry. Understanding this is essential to develop effective policies towards NHS Scotland's sustainability goals [NHS Scotland 2022].

## METHODS

2 questionnaires have been developed: (1) a patient survey to identify attitudes to sustainability issues when attending for extractions, (2) a questionnaire for clinical staff involved in managing patients attending for extractions to identify 'professional' attitudes to sustainability issues for patients attending for extractions. Patients attending for extractions in the Oral Surgery department of Aberdeen Dental Hospital and staff members involved in their care have been invited to complete their respective questionnaires. Descriptive statistical analysis has been utilised to evaluate responses. The project has been registered with the NHS Grampian QIAT.



## RESULTS

Although majority of the patients have expressed positive attitudes towards sustainability, not many were prepared to compromise their health when choosing the mode of transport to attend for dental extractions, where most chose to attend by car. All staff member who took part, were not willing to compromise their patient's health for the environment, regardless of their personal sustainability outlook. Majority would recommend that the patient arrives for the dental extraction appointment by car.

## CONCLUSIONS

Current recommendations to minimise the environmental impact of patients travel to and from the dental practice advise either active mode of transport or public transport. Considering the invasiveness of dental extractions, most patients and staff members would advocate for using a car to arrive for the appointment. In order to reach sustainability goals, the NHS Scotland may have to consider other options, such as electric vehicles charging stations or public transport connecting the main hospital hubs with bus and train stations.

**SUPERVISORS:** Dr Anand Lalli, Prof Khaled Khalaf

**FUNDED BY:** Aberdeen Summer Research Scholarship

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# **MENSTRUAL HEALTH AND DISORDERS: AN INTERDISCIPLINARY APPROACH**

**EMILY-JAYNE SHELL**

## **BACKGROUND**

Despite its universal occurrence, the role of menstruation in women's lives is a surprisingly contemporary topic in the research sphere. The introduction of national policies such as Scotland's Woman's Health Plan (2021) acknowledges women's need for improved access to information on menstrual health and management.

## **AIM**

Do current medical guidelines reflect women's priorities in understanding menstrual health and issues?

## **METHODS**

A grounded theory approach to multiple research questions analysing changes to the medical, cultural, social and historical concept and significance of menstruation since 1980. The author is involved in a systematic review of the literature to determine the existing definition of menstrual issue or disorder. A subsequent umbrella review of secondary evidence, clinical practice guidelines and medical textbook chapters aims to understand how the medical perspective, diagnosis and treatment of menstrual health issues has evolved over time and whether these align with wider sociocultural needs. Thematic analysis of surveys, focus groups and interviews will be employed to establish how women and health professionals define menstrual health and disorder, assess whether the medical community is in concordance with the needs of this demographic, and identify gaps for future research.

## RESULTS

This project is currently ongoing, with results pending.

## CONCLUSION

Determining a clear definition of menstrual issues within the medical literature is essential preliminary work before assessing whether women's menstrual health needs are adequately addressed today. This research intends to bridge the gap between medical perspectives and the experiences and priorities of women regarding menstrual health and disorder.

**SUPERVISORS:** Charley Jones, PhD Candidate; Dr. Lucky Saraswat, Consultant Gynaecologist

**FUNDED BY:** Aberdeen Centre for Women's Health Research, INSPIRE



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# DOES PRESENTATION OF STROKE IMPACT DOOR-TO-NEEDLE TIMES AND OUTCOMES?

EMMA MACRAE

## BACKGROUND

Administration of stroke thrombolysis is highly time-dependent, with early clot lysis associated with better clinical outcomes. Patients with milder strokes may have delays in treatment due to delayed symptom recognition and perceived lower priority. This study aimed to investigate whether specific symptom combinations impacted door-to-needle (DTN) times in Minor and Non-minor strokes.

## METHODS

Retrospective observational analysis of thrombolysis data from the Scottish Stroke Care Audit (01 May 2013-30 April 2023) was undertaken. Severity of stroke was dichotomised as Minor stroke (NIHSS  $\leq 5$ ) and Non-minor as (NIHSS  $\geq 6$ ). Logistic regression models were fitted to the data to assess associations of 6S score symptoms (ability to walk; talk; lift arms; were orientated to time, place and person; pre-stroke independence; and lived alone) on mortality and DTN-times.

## RESULTS

Of the 1206 patients, 302 (25%) were Minor and 904 (75%) Non-minor strokes. Minor stroke patients were younger (70.04 vs 73.78 years,  $p < 0.001$ ) and had longer Onset-to-needle (OTN) times (167 vs 150 minutes,  $p < 0.001$ ), DTN-times (55 vs 46 minutes,  $p < 0.001$ ) and admission to scan times (34 vs 29 minutes,  $p < 0.001$ ). Longer DTN-times in Minor stroke patients

were associated with ability to walk; lift arms; pre-stroke independence; inability to talk; not orientated to time, place and person; and having lived alone. Inability to lift arms increased odds of  $\leq 30$ -minute DTN-times in various combinations for Non-minor strokes, but not significantly in Minor strokes.

## CONCLUSIONS

Minor stroke patients experienced longer delays to treatment than more severe strokes. Minor stroke patients were more likely to be discharged home by 7, 30 and 90 days post-admission, with less mortality than more severe strokes. Prioritising all stroke patients to facilitate earlier treatment is likely to further improve the benefits of thrombolysis for both Minor and more severe strokes.

**SUPERVISOR:** Professor Mary-Joan Macleod

**FUNDED BY:** Innes Will Scholarship

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# EXPECTANT MANAGEMENT IN UNEXPLAINED INFERTILITY: A SYSTEMATIC REVIEW OF RANDOMISED TRIALS

GOZDE GULTEKIN

## OBJECTIVES

Expectant management (EM) is an effective option for couples with unexplained infertility (UI) and a good prognosis, but many opt for more invasive interventions. Expectant management is variably defined in the literature, making it challenging to assess its true effectiveness in comparison to active management. Our aim was to investigate how EM is described in randomised clinical trials, identify pregnancy outcomes resulting from this approach and explore their association with the method of expectant management used.

## METHODS

Trials comparing EM with other interventions in couples with UI were included. Two authors independently searched CENTRAL, Embase, and Medline (August 2023) using keywords such as expectant management, natural conception, unexplained infertility, pregnancy, and live births. Reference lists of relevant studies and reviews were searched. The definition of EM included within the trials was assessed and categorised into three groups. Pearson's chi-squared test was used to compare pregnancy rates between the three groups.

## RESULTS

Eight eligible trials reported 138 (19.9%) clinical pregnancies in 694 women in the EM group. Categories of EM included: 1) no advice or intervention

provided (N = 3 ); 2) oral advice on the need for regular intercourse (N= 1); 3) timed intercourse using methods such as menstrual calendars, body basal temperature measurements, luteinising hormone kits or transvaginal ultrasound (N = 4). Five studies with a time horizon of six cycles in each arm underwent statistical analysis. Clinical pregnancy rates in each category were 26.2%, 17.1% and 23.4%, respectively. There was no statistically significant relationship between the type of expectant management and clinical pregnancy rate ( $p=0.08$ ).

## CONCLUSION

Differences in the way EM is described and implemented may not be a significant contributing factor in the different pregnancy rates.

**SUPERVISOR: PROFESSOR SILADITYA BHATTACHARYA**

**FUNDED BY: INSPIRE National Scholarship**

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# TREATMENT FOR ASYMPTOMATIC VAGINAL CANDIDIASIS TO REDUCE PRETERM BIRTH: SYSTEMATIC REVIEW AND META-ANALYSIS

HANAH ABDEL FATTAH

## BACKGROUND

Vaginal candidiasis is a common fungal infection affecting women worldwide. The infection is caused by an overgrowth of *Candida* species, primarily *Candida albicans*, in the vaginal area is what causes the illness, and symptoms are associated with a hyper immune response. Although vaginal candidiasis seldom poses a life-threatening risk, it can nonetheless be extremely uncomfortable, have a negative impact on quality-of-life, and be dangerous for both women and child.

## METHODS

A literature search was performed for all RCTs comparing treatment for vaginal candidiasis (clotrimazole) with usual care (no-treatment). The literature search had no language restrictions and was conducted from 1947-2023 and last updated on 1 August 2023 using EMBASE, MEDLINE, PubMed, and Google Scholar. Pregnant women enrolled in all studies were between 12-20 weeks of gestation. Primary outcome: measuring preterm birth. Secondary outcomes: adverse pregnancy outcomes: premature rupture of membranes, perinatal death, low birth weight and stillbirth. Data was analysed using RevMan software.

## RESULTS

A total of 3 RCTs (1-3) were selected included 3868 pregnant women; 1942 women allocated to treatment of vaginal candidiasis with clotrimazole group versus 1926 women allocated to the usual care (no treatment)



group. The aim was to identify if the treatment of asymptomatic vaginal candidiasis in pregnancy reduces preterm birth. Primary outcome showed that spontaneous preterm birth was 2/50 (4%) and 7/258 (3%) in the treatment group in Roberts et al and Kiss et al respectively compared to 3/49 (6.3%) and 20/238 (8%) in the usual care (no treatment) group in Roberts et al and Kiss et al, respectively. Meta-analysis showed high reduction in spontaneous preterm birth (RR= 0.05, 95% CI= 0.09 to 0.01) in the treatment with clotrimazole group compared to the usual care (no treatment) group.

## CONCLUSION

This systematic review demonstrates that the treatment of asymptomatic candidiasis in early pregnancy reduces spontaneous preterm birth rates. Further well-designed studies adequately-powered are needed to assess the effectiveness of treatment of asymptomatic candidiasis in early pregnancy on preterm birth and other neonatal and pregnancy outcomes.

**SUPERVISOR:** Professor Carol Munro

**FUNDED BY:** Aberdeen Summer Research Scholarship



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# ORAL BACTERIA AND SYSTEMIC INFLAMMATION

JAMES NORMAN

## BACKGROUND

The oral microbiome is the community of microorganisms within the human mouth. It is a diverse ecosystem that consists of bacteria, viruses, fungi, and other microbes. The oral microbiome is unique to each individual and can vary based on factors such as diet, oral hygiene practices, genetics, and overall health. Disturbances in the oral microbiome can cause problems such as elevated levels of pathogenic bacteria, breaks in the oral epithelium and proliferation of a variety of inflammatory disorders. Some of the chronic inflammatory diseases associated with oral bacteria: periodontal disease, rheumatoid arthritis, atherosclerosis.

## AIM

The aim of this review is to explore the link between dysbiosis of bacteria in the oral cavity and levels of systemic inflammation and then consider some methods through which this dysbiosis can be prevented or treated.

## METHODS

This literature review was performed with careful use of google scholar along with pub med research.

## CONCLUSIONS

Maintaining good oral hygiene will help regulate the oral microbiome, therefore reducing systemic inflammation. Completing regular dental checkups and adhering to a regular brushing regime will help promote a

healthy oral microbiome. Lifestyle adjustments can also be made such as doing regular physical activity and eating a healthy, balanced diet along with also reducing unhealthy habits such as smoking. These interventions will elicit a lower level of systemic inflammation therefore reducing the predisposition a person will experience to chronic inflammatory disease.

**SUPERVISOR: DR MONIKA GOSTIC, PHD**

**FUNDED BY: Aberdeen Summer Research Scholarship**



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# ASSESSMENT OF THE IMPACT OF PECTIN-RICH DIETS ON TOLERANCE OF MOUSE SMALL INTESTINE TO IONISING RADIATION

JUSTYNA KACZMAREK

## BACKGROUND

There's an urgent need for safer approaches in pelvic radiotherapy, as current chemoradiation schedules heighten radiation toxicity to the intestines. The Kiltie lab's research on dietary fibers, shows promise in enhancing tumor control while reducing acute intestinal toxicity after 14 Gy, compared to a low-fiber diet. Pectin-rich diets, known for antiinflammatory properties, may shield the intestine from radiation toxicity. We hypothesize that 10% pectin alone or combined with 5% psyllium can mitigate acute tissue toxicity in the small intestine of mice exposed to 14 Gy, as assessed by the intestinal crypt assay.

## METHODS

Six-week-old female C57BL/6 mice were fed diets with varying fiber content (0.2% cellulose, 10% pectin, 5% psyllium, or 10% pectin/5% psyllium) for two weeks. They were then subjected to abdominal irradiation at doses of 10 Gy, 12 Gy, or 14 Gy, or left unirradiated. Mice were euthanized, and Swiss rolls of their small intestine and colon were prepared into sections and scanned.

Crypt assay analysis utilized QuPath software, focusing on irradiated intestinal sections with over 6 mm of damage. Control crypt counts per small intestine length were established from non-irradiated animals. Data was semi-logarithmically plotted for percentage surviving crypts at 10, 12, and 14 Gy. Graph Pad software performed Tukey's multiple comparisons test to discern significant survival differences between treatment groups.

## RESULTS

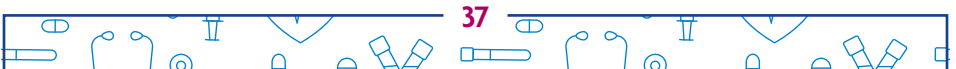
There was a significant difference in mean survival between the 0.2% Cellulose and Pectin groups ( $p < 0.001$ ), between the 0.2% Cellulose and Pectin + Psyllium groups ( $p = 0.002$ ) and between the Psyllium and Pectin groups ( $p = 0.020$ ). Pectin and Pectin + Psyllium demonstrated higher survival compared to Cellulose. Pectin demonstrated a higher survival compared to Psyllium.

## CONCLUSIONS

These results indicate that Pectin, both in isolation and in combination with Psyllium, exhibits a protective effect on crypt cell survivability following radiation exposure.

**SUPERVISORS:** Professor Anne Kiltie, Dr Aliu Moomin, Ms Susan Hayes

**FUNDED BY:** Innes Will Scholarship



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# DOES ROSE ANGINA IN MIDLIFE WOMEN MATTER? FURTHER EVIDENCE FROM THE ROYAL COLLEGE OF GENERAL PRACTITIONERS' ORAL CONTRACEPTION STUDY

**KATARZYNA (KATE) GALKA**

## BACKGROUND

The Royal College of General Practitioners' Oral Contraception Study began in 1968 to determine the health effects of oral contraceptives. Between 1994 and 1995, during a midlife health survey 8694 women in the cohort completed the Rose Angina questionnaire assessment of symptoms of exertional chest pain, likely angina, and prior myocardial infarction.

Symptom reporting was associated with an increased chance of dying five years later even among women without a past diagnosis of ischaemic heart disease (IHD). At the five-year follow-up, few women had died prohibiting examination of cause-specific mortality. We aimed to determine the sequelae of Rose angina symptoms in terms of all-cause and cause-specific mortality among the cohort almost 30 years post-survey.

## METHODS

Vital status and cause of death information was updated. The relationship between different Rose angina types and all-cause and cause-specific mortality by 30 June 2022 was examined using Kaplan-Meier survival curves, unadjusted and adjusted Cox regression. Data were analysed using SPSS version 28.0.1.

## RESULTS

By end of follow-up, 3263 (37.5%) women had died. Compared to women who did not report Rose angina, women with each Rose angina type had an increased risk of death, except those who reported Grade 1 Rose angina with no IHD history. Each Rose angina type was associated with increased IHD death. Women without a prior IHD diagnosis and grade II Rose angina at survey completion had the highest all-cause (adjusted hazard ratio 2.11, 95% confidence interval 1.53 to 2.93) and IHD-specific (aHR 5.75, 95% CI 3.05 to 10.86) mortality risk.

## CONCLUSIONS

Women reporting Rose chest pain had a higher risk of all-cause and IHD death, even in the absence of a prior IHD history. Our findings highlight the importance of identifying symptomatic women in midlife, so their IHD risk can be managed appropriately by their healthcare providers.

**SUPERVISOR:** Dr Lisa Iversen

**FUNDED BY:** The Innes Will Scholarship



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# INVESTIGATING THE PROGNOSTIC VALUE OF NEUTROPHIL-LYMPHOCYTE RATIO, PLATELET-LYMPHOCYTE RATIO, AND MONOCYTE-LYMPHOCYTE RATIO IN MALE BREAST CANCER PATIENTS

LOK TIN (MICHAEL) WONG

## BACKGROUND

Human Male Breast Cancer (MBC) is a rare disease, accounting for less than 1% of all breast cancers and male malignancies. The link between inflammation and steps of tumorigenesis such as tumour initiation, progression and metastasis are well recognised. Immunologic-based parameters such as Neutrophil-Lymphocyte ratio (NLR), Platelet-Lymphocyte Ratio (PLR) and Monocyte-Lymphocyte Ratio (MLR) have emerged as potential biomarkers for the disease prognosis due to their high accessibility from routine blood tests and clinical interest. Although these have been well studied in human female breast cancer (FBC), it is yet unclear if they could be applied in MBC. The aim of this study was to determine if elevated NLR, PLR and MLR were associated with outcome in MBC patients.

## METHODS

A total of 63 MBC patients from NHS Grampian, Highland and Tayside, with age range from 51 to 94, were included in the study. Caldicott Guardian Approval was obtained for clinical data collection. Baseline (pre-treatment) blood data were selected and patients without baseline blood data were excluded from the analysis. Cut-off point was determined by receiver operating curve using Cut-Off Finder and statistical analysis was performed on GraphPad Prism to analyse overall survival (OS).



## RESULTS

Excluding patients with no baseline blood data, NLR and PLR were analysed from 52 patients and MLR from 37 patients. An elevated NLR ( $>3.26$ ;  $p=0.004$ ) was found significantly associated with decreased OS rate. However, an elevated PLR ( $>116.5$ ;  $p=0.067$ ) and MLR ( $>0.27$ ;  $p=0.15$ ), respectively, had no impact on OS.

## CONCLUSION

Our results suggested that NLR might be a useful biomarker in predicting survival in MBC, which is consistent with findings from previous studies in both male and female breast cancer. However, in contrast with a previous MBC study of 38 patients, our data showed that neither PLR nor MLR had an impact on survival.

**SUPERVISORS:** Professor Valerie Speirs, Miss Beatrix Elsberger, Dr Gordon Urquhart

**FUNDED BY:** The Cyril & Margaret Gates Scholarship



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# THE GENERATION OF CANDIDA ALBICANS OVEREXPRESSION MUTANTS TO CONTRIBUTE TO A GENOME-WIDE LIBRARY FOR FUNCTIONAL GENOMICS

MARK MCMILLAN

## BACKGROUND

*Candida albicans* is a commensal fungus that can have pathogenic properties depending on host status. The mortality rate of sepsis caused by *C. albicans* is around 40% and it is the leading cause of fungal infections worldwide. Research into the genetics of *C. albicans* will give a better understanding of its pathobiology, which could help the development of new therapies improving patient outcomes. Currently there are limited options for treatment and the development of antifungal resistance only makes this situation worse. The approach for this project is to produce a library of over-expression mutants to investigate gain-of-function phenotypes. This project aims to create over-expression plasmids and mutant strains to add to the genome-wide library.

## METHODS

LR Clonase™ reactions were performed to transfer *C. albicans* cloned genes from unique pre-made BP clones into bar-coded plasmids using Gateway technology generating overexpression plasmids. These reactions were transformed into *Escherichia coli* cells producing expression clones. Single colonies that had grown on selective medium were picked onto new plates. Broth cultures were then grown from these and used for plasmid DNA extractions using Qiagen mini-prep columns. After restriction digestion of the plasmid DNA samples the presence of cloned genes was verified by agarose gel electrophoresis. The plasmids were transformed into *C. albicans* cells to integrate the overexpression cassettes into the yeast genome. The fungal colonies were isolated and verified with colony PCR.

## RESULTS

55 verified overexpression plasmids were generated by gene cloning. After yeast transformations 17 plasmids were shown to be correctly integrated into the *C. albicans* genome creating overexpression strains. Included in the project were overexpression plasmids that carried genes with the function of regulating the cell cycle, an essential chaperone, others with unknown functions.

## CONCLUSIONS

These mutants will be used to perform high throughput phenotypic characterisation to advance our knowledge of the genomics of this important pathogen.

**SUPERVISOR:** Professor Carol A Munro

**FUNDED BY:** Aberdeen Summer Research Scholarship

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# RELATION BETWEEN PLASMA VITAMIN C AND CARDIOVASCULAR DISEASES MORTALITY IN EPIC-NORFOLK PROSPECTIVE STUDY

MARK YUN CHIH TSAI

## BACKGROUND

Vitamin C, known as ascorbic acid, is strongly linked with its capacity with rampaging and neutralising free radical and neutralise. It has been proven to reduce oxidative stress and prevent inflammation, which are substantive characteristics in suppressing the development of cardiovascular diseases (CVD). Due to its benefits to physiological function, studies have long been interested in the relationship between vitamin c and long-term CVD outcomes. Even though vitamin c has many obvious benefits, recent studies have also indicated the drawbacks of vitamin c. Some studies report an inverse linear relationship between vitamin c and CVD outcomes. Furthermore, vitamin c's threshold effect has been discussed as recessive plasma vitamin c would not bring any benefits but also aggravate CVD outcomes. Therefore, this research project is aimed to investigate the relation of the concentration of plasma vitamin c and CVD mortality.

## METHOD

We use data from the EPIC-Norfolk prospective population-based study to examine the relation between long-term patterns of plasma vitamin C levels and cardiovascular disease mortality over a long-term follow-up of over 25 years. Participants' vitamin C intake is classified into four level of categories according to the quartile distribution in the study population. Cox proportional hazards model is used to demonstrate the risk for CVD death according to according to participants' plasma vitamin C levels. Threshold effect analyse is used to explore any possible non-leaner relationships.

## RESULTS

The result of the research project is still pending. Based on the cox proportional hazards model, the research has shown initial outcomes of 4 quartiles of plasma vitamin c concentrations and CVD mortality survival probability. Expectedly, the first quartile, which indicates the lowest vitamin c plasma concentration, shows the lowest survival probability; and the fourth quartile shows the highest survival probability. However, the second quartile and the third quartile does not exhibit the significant difference. Instead, they share approximate same survival probability pattern. Accordingly, we can further discover the threshold effect of plasma vitamin c concentration to CVD mortality based on the initial finding.

## CONCLUSION

We are expecting to demonstrate a non-linear or U-shaped relationship between plasma vitamin c concentrations and CVD mortality among adults by using the EPIC-Norfolk studies.

**SUPERVISORS:** Tiberiu Pana & Phyto Kyaw Myint

**FUNDED BY:** NHS Grampian Endowment Fund



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# INPATIENT OUTCOMES OF ACUTE ISCHAEMIC STROKE WITH PERIPHERAL VASCULAR DISEASE: A NATIONAL INPATIENT SAMPLE STUDY

MARRIA JOBI

## BACKGROUND

Peripheral vascular disease (PVD) is associated both with incident of stroke and cardiovascular mortality. Despite its clinical importance, the relationship between PVD and stroke outcomes remains uncharacterised. Furthermore, whether there are any sex or racial differences among the outcomes of stroke patients with PVD is unknown. We aimed to determine the association between PVD and inpatient stroke outcomes and whether there are racial and sex disparities within these outcomes.

## METHODS

Acute ischaemic stroke admissions between January 2016 and December 2019 from the United States National Inpatient Sample were extracted. The associations between sex, race, and stroke inpatient outcomes (in hospital mortality, routine discharge, and length of stay > 4 days) were analysed using multivariable logistic regression models that were adjusted for age, race, and a range of comorbidities.

## RESULTS

348,929 records representing 1,744,645 hospitalisations were included. Median (interquartile range) age was 71 (60 – 82) years. 8.42% of patients had PVD, with 52.12% being male. PVD was not associated with mortality in either sex. In men, PVD was associated with lower odds of prolonged hospitalization (0.88 (0.84 - 0.92)) and greater odds of routine discharge (1.42 (1.34 - 1.49)). Conversely, in women PVD was associated with higher

odds of prolonged hospitalisation (1.14 (1.08 - 1.19)) and lower odds of routine discharge (0.71 (0.67 - 0.74)). Compared to Whites, Black patients had higher odds of prolonged hospitalization (1.43 (1.33 - 1.53)) and lower odds of routine discharge (0.73 (0.67 - 0.79)).

## CONCLUSIONS

PVD was not significantly associated with in-hospital mortality. The association between PVD and other adverse outcomes was sex-specific, with only women having higher odds of prolonged hospitalisation and adverse discharge. There were also ethnic disparities with ethnic minorities having higher odds of PVD-related adverse outcomes. Further research is required to understand the factors driving these disparities.

**SUPERVISORS:** Dr Tiberiu Pana, Professor Phyo Myint

**FUNDED BY:** Aberdeen Summer Research Scholarship Programme

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# INCLUDING ANATOMICAL VARIATIONS IN MEDICAL SCHOOLS' CURRICULA

MARYAM AL GHAMMARI

## BACKGROUND

Anatomical variations are one of the topics that are frequently neglected and not given enough attention in medical schools. Some variations are particularly important in various clinical aspect including predisposition to illness, symptomology, examinations, and investigations and more importantly in surgical procedures. In this project we aimed to get an insight into teaching anatomical variations in terms of its current status in the curriculum, student's perception and review the available resources and learning outcomes.

## METHODS

This project was carried out in different directions and using multiple methods. Firstly, several databases were used, and a literature review of anatomical variations in medical education was undertaken. After this, dissection was done on the neck region of 5 phenol embalmed bodies focusing on the thyroid gland, its neurovascular supply, and variations found in this area to have an idea about what might students achieve through dissection. Also, a focus group study aimed at 4th-year medical students was held in the Suttie Centre to gather students' thoughts and suggestions. Core regional anatomy learning outcomes are reviewed and compared with the university resources. In addition to this, one of the main anatomy resources in the medical school (AnatomyTV) has been audited.



## RESULTS

In the literature review, it was evident that anatomical variation itself is a common topic but there has not been much on teaching it. Also, most papers encouraged introducing this concept at a very early stage in medical school.

Dissection was done on five necks and every single body had at least one anatomical variation which supports using dissection as a teaching tool. In the Focus group study, there were arguments on both sides about whether to teach it or not and students gave useful recommendations. In addition to this, some resources have been reviewed and areas for continued development have been identified and feedback was provided.

## CONCLUSIONS

All in all, teaching some anatomical variation is important for safe clinical practice. This project has studied the topic from different points including the literature view, using dissection, and reviewing what we already have on anatomical variations.

**SUPERVISORS:** Dr Okezi Ononeme and Dr Hubaira Hubaira

**FUNDED BY:** Aberdeen University Research Scholarship

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# QUANTIFICATION OF PD-L1 IN NORMAL, PREMALIGNANT AND MALIGNANT ORAL AND OROPHARYNGEAL TISSUES USING IMAGE ANALYSIS

MAX MCALLAN

## BACKGROUND

Oral and oropharyngeal cancers commonly present as squamous cell carcinomas. The main aetiological factors are lifestyle factors, such as tobacco, alcohol consumption and human papillomavirus (HPV) for a subtype of oropharyngeal cancers. Prognosis is poor due to late diagnosis with surgery, chemotherapy and radiotherapy often ineffective. Therefore, research has moved towards targeting the immune system to boost anti-tumour immune responses. Such immunotherapeutic approaches include targeting the Programmed Death –1 (PD-1) and its ligands PD-L1 and PD-L2 using immune checkpoint inhibitors. PDL-1 is, expressed by many tumours including head and neck cancers. The efficacy of immune checkpoint inhibitors targeting the PD-1/PDL-1 axis is thought to depend on the levels of PD-L1 expression in the tissues. Furthermore, changes in PDL-1 expression could be a marker for predicting disease progression, thus potentially aiding in predicting malignant transformation.

The aim of this project was to quantify PD-L1 expression in normal, pre-malignant and malignant tissues of the oral cavity and oropharynx using image analysis to identify changes associated with disease progression.

## METHODS

Samples of normal (n=5); low grade dysplasia, LGD, (n=3); high grade dysplasia, HGD, (n=3) and squamous cell carcinoma, SCC, (n=3); from the oral cavity and normal (n=1); oral epithelial dysplasia, OED, (n=4); HPV- (n=4) and HPV+ (n=3) SCC oropharyngeal tissues were obtained

from NHS Grampian Biorepository. These were stained for PD-L1 using immunohistochemistry and whole slide scans were analysed using the image analysis software- QuPath v. 0.4.3. Staining vectors across all samples were normalized before undergoing positive cell detection to assess the percentage of PD-L1 expressing cells and the intensity of expression categorized as weak, intermediate and strong. GraphPad Prism v. 10.0.3 was used for statistical analysis to compare PDL-1 expression between different groups.

## RESULTS

In oropharyngeal tissues, the mean percentage of PD-L1 positive cells in HPV+ SCC (4.77%) was similar to normal tissue (2.52%), but statistically significantly lower than HPV- SCC (14.75%). There was an increase in PD-L1 cell expression in OED tissues (12.30%) compared to normal, but this was not statistically significant. In the oral cavity, SCC samples showed the highest mean percentage of PD-L1 expressing cells (19.66%) compared to LDG (4.03%), HGD (2.62%), with lowest percentage in normal tissues (1.70%).

## CONCLUSION

The results of this study showed a gradual increase in PDL-1 expression from normal, through premalignant with malignant oral and oropharyngeal tissues expressing the highest levels of PDL-1. Interestingly, PD-L1 expression was significantly higher in HPV- oropharyngeal cancers compared to HPV+. As PD-L1 plays a role in inhibiting anti-tumour immune responses, an increase in PD-L1 expression in HPV- SCC could explain the poorer prognosis. Our findings suggest the potential of PDL-1 as a marker of disease progression and patient stratification for immunotherapy.

**SUPERVISOR:** Dr Rasha Abu-Eid

**FUNDED BY:** Aberdeen Summer Research Scholarship



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# A COMPARISON OF EMERGENCY AND ELECTIVE RESECTIONAL COLORECTAL CANCER DEMOGRAPHICS AND OUTCOMES IN A TERTIARY COLORECTAL UNIT

NATTHAYA EIAMAMPAI

## BACKGROUND

This study aims to establish the composition of the CRC resectional workload within a University Teaching Hospital Colorectal Unit and to compare outcomes in elective with emergency patients.

## METHODS

Clinical outcomes and patient demographics of all CRC patients on the colorectal unit at Aberdeen Royal Infirmary were collected prospectively over a five-year period (2018-2023). Patients were categorised into emergency and elective groups based on resectional urgency. Outcomes included postoperative length of stay (LoS), readmission rate, mortality, and complication rate. Test for statistical significance was carried out with SPSS using parametric and non-parametric tests.

## RESULTS

926 CRC patients undergoing resection were included with 819 (88.1%) elective and 108 (11.7%) emergencies. Gender distribution was similar with 466 (57.1%) elective and 59 (54.6%) emergency patients being males ( $p=0.625$ ). Median elective age was 69.33 years (IQR 14.28) and 71.35 years (IQR 18.11) for emergencies ( $p=0.918$ ). The median elective BMI was 27.30 (IQR 7.00) compared to 26 for emergencies (IQR 8.0) ( $p=0.008$ ). Emergency postoperative LoS was 10 days (IQR 7) and 8 days (IQR 8) for electives ( $p<0.001$ ), with 1 (0.9%) and 29 (3.6%) readmissions in each group, respectively ( $p=0.148$ ). 50 (46.3%) emergency patients had  $\geq 1$

complications in comparison to 342 (41.9%) elective patients ( $p=0.386$ ). Mortality was 4.6% for emergency patients versus 0.7% for electives ( $p<0.001$ ). Complex pelvic resections were far more common in the elective group.

## CONCLUSIONS

Emergency resections account for more than 10% of the resectional workload. Demographics were similar in both groups. LOS and mortality were higher in the emergency group. These findings indicate that emergency patients are most likely more unwell.

Complex pelvic resections were more common in the elective setting thus influencing the complication rates in this group. Further studies will aim to control for resection type allowing a direct comparison of the impact on operative urgency on outcome.

**SUPERVISOR:** Mr Craig MacKay (consultant colorectal surgeon)

**FUNDED BY:** University of Aberdeen Summer Research Project



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## PLAN-A: REVIEW 4

OLIVIA STEEL

### BACKGROUND

Plan-A is a decision aid to ensure that NHS maternity services adequately support pregnant women in making an informed decision regarding mode of birth. Despite being legally obliged to do so, providers struggle to achieve this. One reason for this is an absence of balanced, current information accessible to pregnant women. A decision aid could help to overcome this. A fellow student and I specifically investigated updating the NICE 'caesarean birth' clinical guideline systematic review (NCBCGSR).

### METHODS

In this systematic review we followed the inclusion and exclusion criteria set by the NCBCGSR. A five-person team screened titles and abstracts; followed by full text articles. Subsequently data extraction and quality analysis were performed on the articles eligible for the study; utilising the Newcastle-Ottawa and ROBIS tools.

### RESULTS

After screening titles and abstracts there were 152 full text articles retrieved for review. This resulted in 28 final studies eligible for analysis. All adopted studies were conducted in high income countries and published between 2019-2022. There were 5 systematic reviews and meta-analysis; 7 prospective cohort studies; 5 retrospective cohort studies; 8 population-based cohort studies; 2 longitudinal cohort studies; and 1 cross-sectional study. Updated outcomes for NICE were derived from 19 studies; with a total of 9 long-term and 6 short-term outcomes. New outcomes, which NICE had not previously reported on, were extracted from 21 studies; generating 36 long-term outcomes and 5 short-term outcomes.

## CONCLUSIONS

On balance there were many positive and negative outcomes highlighted with both planned caesarean and planned vaginal births. Many of the long-term outcomes, which were novel to NCBCGSR relative to NICE, assessed neurological function; which is of relatively recent focus in paediatric research.

**SUPERVISORS:** Dr Mairead Black and Miriam Brazzelli

**FUNDED BY:** National Institute of Health and Care research



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# CONTAINERISATION OF DEEP-LIBRA: AI ENHANCED RISK ASSESSMENT OF BREAST DENSITY TO OPTIMISE BREAST CANCER SCREENING

REGINA JESSLYN SUMARLIE

## BACKGROUND

Breast cancer remains a global health concern, with a high incidence and mortality rate. Early detection is critical, highlighting the importance of an effective screening program. Breast density is an important risk factor for breast cancer. Increasing functionality of Artificial intelligence (AI) has the potential to optimise current screening programs and enable personalised risk assessment. Deep-LIBRA is an AI method that allows the quantification of breast density within the risk assessment process. Safe Haven Artificial Intelligence Platform (SHAIP) is a system that allows access to de-identified and linked clinical data. Incorporating Deep-LIBRA into existing programs requires validation using breast cancer images in a safe environment such as SHAIP.

## METHODS

Deep-LIBRA is accessible on GitHub, from which it was cloned. A dockerfile was written to set up the environment and dependencies required for Deep-LIBRA to run. A dockerimage was created and configured in alignment with the specification within the dockerfile. The resulting dockerimage was used to run a docker container, providing an efficient environment to run Deep-LIBRA that is also independent, isolated, and accessible on any machine.



## PROGRESS TO DATE

To date, I have successfully installed all the dependencies required and set up the dockerfile correctly. A dockerimage was built and the docker container ran successfully on a local host. However, the graphical user interface (GUI) failed to load. The next step would be to investigate the command line interface (CLI), X or Virtual Network Computing (VNC) server to enable GUI functionality within the container.

## EXPECTED OUTCOME AND FUTURE GOALS

I expect to utilise either CLI, VNC, or X server to run the GUI within the container. Subsequently, I would export the container to SHAIIP for comprehensive algorithm evaluation using breast screening images in a secure environment. Grampian Data Safe Haven (DaSH) will facilitate secure data linkage and hosting for Deep-LIBRA, enabling the assessment of its suitability for integration into the current screening program.

**SUPERVISORS:** Professor Lesley Anderson, Dr Clarisse De Vries

**FUNDED BY:** INSPIRE National Centre of Excellence Scholarships



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# PRE-ECLAMPSIA IS ASSOCIATED WITH INCREASED CALCIUM INFLUX AND ENDOPLASMIC RETICULUM STRESS IN PLACENTAL ENDOTHELIAL CELLS

RHEURE ALVES-LOPES

## BACKGROUND

Pre-eclampsia (PE) is a major maternal-neonatal health concern characterized by hypertension and metabolic disturbances during pregnancy. We've identified elevated endoplasmic reticulum (ER) stress and calreticulin mobility changes in placental endothelial cells (pECs) under hypoxia. These findings hint at calcium mobilization alterations. Our research aims to elucidate calcium and ER stress roles in mouse PE models and hypoxia-exposed human pECs.

## METHODS

We used mice overexpressing human renin and angiotensinogen, developing high BP from gestational day (GD) 13.5, and controls (C57BL/6). Nifedipine (1mg/kg in 0.5ml saline, s.c.) or saline was administered at GD14.5 and placentas removed at GD18.5. Protein expression were evaluated by western blot. ECs were extracted from human placentas of healthy pregnancies and exposed to hypoxia (0.5% O<sub>2</sub>) or control conditions (8% O<sub>2</sub>). Before cell extraction, placental explants were pre-treated with nifedipine (0.1 μM), 4-Phenylbutyric acid (PBA, 1 mM) or DMSO for 24 hrs. Angiogenesis was assessed by tube formation assay on matrigel. Calcium influx was measured in endothelial cells isolated from human placentas using Cal520-AM probe.

## RESULTS

In placentas from PE mice, we observed elevated IRE $\alpha$  and PERK expression when compared to control (IRE $\alpha$  : 306ffl64%, p=0.020) (PERK: 216ffl40%, p=0.037), which was subsequently reduced by nifedipine treatment (IRE $\alpha$ : 71ffl66%, p=0.009) (PERK: 75ffl38%, p=0.006). While ATF6 levels did not differ significantly between groups, nifedipine treatment in PE mice led to a notable reduction (76ffl24%, p=0.022). In placental endothelial cells (pECs), pre-treatment with nifedipine resulted in a remarkable 17-fold increase, and 4-PBA showed a 40-fold increase in the formation of tubes on matrigel when compared to DMSO control (p<0.001) in the context of hypoxia. Notably, calcium influx induced by Angiotensin II, but not endothelin I, exhibited an increase in human placental endothelial cells under hypoxic conditions.

## CONCLUSIONS

PE placentas present increased calcium influx and ER stress, effect reduced by calcium channel blocker, with additional pro-angiogenic role. This work highlights the potential of nifedipine to mitigate ER stress and calcium dysregulation shedding light on optimal therapeutic approaches for pre-eclampsia.

SUPERVISOR: Assistant Professor Mariane Bertagnolli

FUNDED BY: Henderson Global Medicine Research Bursary



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# ASSOCIATION OF SERUM ALBUMIN LEVELS AND POST STROKE OUTCOMES IN ACUTE ISCHAEMIC STROKE: ANALYSIS OF THE NORFOLK AND NORWICH STROKE REGISTRY, SYSTEMATIC REVIEW, AND META-ANALYSIS

ROSA J. THUEMMLER

## BACKGROUND

Low serum albumin levels have been associated with poor acute ischemic stroke (AIS) outcomes. We hypothesised this relationship may be non-linear and aimed to systematically assess this association and quantify the evidence.

## METHODS

Prospective stroke data from the Norfolk and Norwich Stroke and TIA Register were analysed. Consecutive AIS patients aged  $\geq 40$  years admitted Dec 2003-Dec 2016 were included. Outcomes were in-hospital mortality, poor discharge functional outcome (modified Rankin score 3-6), length of stay (LoS)  $>4$  days and long-term mortality. Restricted cubic spline regressions investigated the relationship between albumin and outcomes. We then updated a systematic review using the PubMed, Scopus and Embase databases from January 2020-June 2023 and quantified the evidence in a meta-analysis.

## RESULTS

9,979 patients were included, mean age (standard deviation) = 78.3 (11.2) years), mean serum albumin 36.69g/L (5.38). Compared to the cohort median, albumin  $<37$ g/L was associated with up to 2-fold higher long-term mortality (HR<sub>max</sub>; 95% confidence interval = 2.01; 1.61-2.49) and in-hospital mortality (RR<sub>max</sub>; 95% confidence interval = 1.48; 1.21-1.80). Levels  $>44$ g/L were associated with long-term mortality (HR<sub>max</sub> 1.12; 1.06-1.19).

Two studies met inclusion criteria from our search strategy and seven were added from a prior systematic review, yielding a total of 23,597 patients. Low albumin was associated with an increased risk of long-term mortality (2 studies; relative risk 1.57 (95% CI 1.11-2.22), as was low-normal albumin (RR 1.10 (95% CI 1.01-1.20).

## CONCLUSIONS

Strong evidence suggests that patients with hypoalbuminemia and low-normal albumin on admission have increased long-term mortality with AIS. Future studies should explore nutritional interventions for better stroke outcomes and consider routine nutritional assessment in at-risk groups.

**SUPERVISOR:** Dr Tiberiu Pana and Professor Phyo Kyaw Myint

**FUNDED BY:** The Innes Will Scholarship



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# WHICH PARAMETERS IN THE CONSTRUCTION OF COMPLETE DENTURES FOR EDENTULOUS PATIENTS IMPROVE PATIENT SATISFACTION AND OVERALL QUALITY OF LIFE?

SCOTT CALVERT

## BACKGROUND

In 2017, it was estimated that 4.8% of the worldwide population was edentulous, with the majority being over 60 years of age. Edentulous patients often experience a variety of problems with their dentures. Therefore, this review aimed to investigate which parameters in their construction improve patient satisfaction and oral health-related quality of life (OHRQoL).

## METHODS

A systematic literature search was conducted using the following online databases: Medline, Embase, CENTRAL and Web of Science. Specific inclusion and exclusion criteria were used to include only relevant texts.

## RESULTS

23 papers were included in this review. The two main parameters studied were method of denture fabrication and occlusal scheme, with no statistical difference between groups analysed. All included studies assessed patient satisfaction but 10 did not assess OHRQoL. The general consensus was that there is no difference in OHRQoL or patient satisfaction for patients with complete dentures fabricated by conventional or simplified techniques and only two studies concluded that there was no statistical difference between balanced and non-balanced occlusal schemes in terms of the same outcomes.

## CONCLUSIONS

Selected omission of a secondary impression during construction of removable complete dentures does not affect patient-related outcomes significantly, and currently, there is no superior occlusal scheme for complete dentures in relation to patient satisfaction and/or OHRQoL.

**SUPERVISORS:** Dr Rosa Moreno Lopez and Dr Paul Bond

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# CHANGES TO ADJACENT SEGMENT HEIGHT AFTER ANTERIOR CERVICAL DISCECTOMY AND FUSION: A SOURCE OF POST-OPERATIVE PAIN?

**THOMAS DIFFLEY**

SurgAnat Scholarship

## BACKGROUND

Anterior Cervical Discectomy and Fusion (ACDF) is a well-recognized procedure for the treatment of nerve root entrapment. Common symptoms of radiculopathy include significant pain, reduced power and function of the upper limbs which can be debilitating to patients. Post operative complications are frequent, with inadequate pain control, dysphagia and damage to surrounding structures often resulting in significant post-operative morbidity.

## AIMS

This study aims to analyse changes in adjacent segment anatomy after discectomy and fusion with variously sized implants to better understand how these may play a role in post-operative pain and morbidity for patients.

## METHODS

Four Phenol cadavers were selected, and the anterior approaches were made by a qualified Spinal Surgeon. By drilling into C3,4,5 and 6 vertebral bodies we created permanent measuring points for each segment. Prior to the annulotomy, a steel protractor was inserted gently into each hole and then the points were imprinted onto paper, these points were then measured using a micrometer to a resolution of 0.01mm. The annulotomy was then performed by the same spinal surgeon and various cage sizes provided by Globus Medical were inserted in between C4 and C5, after visual identification and secondary observer confirmation. After each



cage was inserted a measurement from the drilled points was taken again and recorded in order to measure changes in adjacent segment height. Non-Parametric and multivariable statistical analyses were undertaken to determine the relationship between compression and cage dimensions and a Cochran's alpha analysis was used to determine the reliability of the result.

## RESULTS

Cochran's Alpha analysis demonstrated a high degree of Inter-observational reliability  $\alpha=0.981$ , 95%CI= 0.971-0.989). In all cadavers, C5-C6 height was significantly reduced as cage height increased (2664:  $B= -0.557$ ,  $p<0.001$  95%CI = -0.735, -0.380), (2671:  $B=-0.156$ ,  $p=0.002$ , 95%CI = -0.247, -0.065), (2717:  $B=-0.270$ ,  $p<0.001$ , 95%CI = -0.383, -0.158). C3-4 Height in specimens 2664 and 2717 also related to cage height in the same way (2664,  $B=-0.631$ ,  $p<0.001$ , 95%CI = -0.873, -0.39), (2717,  $B=-0.454$ ,  $p<0.001$ , 95%CI = -0.550, -0.358) however specimen 2671 did not follow a multilinear regression model ( $f = \{4,12\}=0.962$ ,  $p=0.463$ ,  $R^2 = 0.243$ ) Instead following a polynomial, likely cubic, relationship ( $f\{3,13\} = 5.416$ ,  $p = 0.012$ , Unweighted to lordosis  $R^2 = 0.556$ ). The use of a lordotic or parallel implant had no significant impact on adjacent segment height (Paired T-Test,  $p=0.237$ , 0.142, 0.124, 0.194, 0.46, 0.102)

## CONCLUSIONS

ACDF significantly changes adjacent segment geometry and anatomy which may be a possible source of post-operative symptoms in patients. Further research needs to be conducted on the 3-dimensional changes to vertebral foramen geometry as a result of this compression and on the effect this compression has on the stimulation of both the Sinovertebral nerves in the discs and on the meningeal branches that innervate the vertebral bodies. Additionally, further research needs to be conducted on the epidemiology and characteristics of post-operative pain after ACDF surgery to demonstrate the exact nature of symptoms and how they may relate to surgical intervention.



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### 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.

- Email: [assam@nsamr.ac.uk](mailto:assam@nsamr.ac.uk)
- Facebook: [AberdeenASSAM](#)
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### ABERDEEN CLINICAL ACADEMIC TRAINING (ACAT)

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[www.abdn.ac.uk/smmsn/acat](http://www.abdn.ac.uk/smmsn/acat)

