MONASH University

MONASH
MEDICINE
NURSING AND
HEALTH SCIENCES

MRSS ANNUAL BMEDSC(HONS) YEARBOOK 2024

GROUP OF EIGHT AUSTRALIA

Message from the BMedSc(Hons) Convenor and Course Management Committee

Dear BMedSc(Hons) students, congratulations on completing your BMedSc(Hons) degree! Well done, it is a very significant achievement and I hope that you all feel extremely proud of what you have achieved.

The School BMedSc(Hons) Coordinators, the Course Management Committee and I, would like to thank you for choosing to enrol in BMedSc(Hons). We hope that the year has challenged you and given you an appreciation of; how new knowledge is created, how research can be translated into clinical practice and an appreciation of how much more there still is to learn. We also hope that you will have much more confidence in your ability to read and critically evaluate new research findings, and to develop into a practitioner of evidence-based medicine.

We would like to sincerely express our thanks to your supervisors and to other members of their research teams who have devoted their time to support your learning during the year, and to the examiners who volunteered their time to assess Literature Reviews, Theses, Departmental Oral Seminars, and the Faculty Presentations. A particular thank you to Brenna Dempsey and to each of the School BMedSc(Hons) academic and support staff who do a huge amount of behind-the-scenes work during the year to ensure that the course runs smoothly. The Course would not be possible without them. We would also like to thank your BMedSc(Hons) Student Representative Seiyon Sivakumar for giving us feedback and supporting your interests during the year.

The BMedSc(Hons) Course Management Committee and I, wish you all the very best for your future and we hope to see and hear about your future research endeavours.

A/Professor Megan Wallace, Director of Medical Student Research,
Faculty of Medicine, Nursing and Health Sciences

Message from MRSS

Congratulations to everyone on completing the BMedSc(Hons) course for 2024! We have made significant strides on this research journey, acquiring a wealth of skills and knowledge along the way. We should all be proud of what we've accomplished and how far we've progressed in our research. It's truly inspiring to witness the breadth and depth of projects within our cohort.

This yearbook showcases the diverse range of projects we've undertaken, from lab-based studies to clinical trials. I hope this yearbook serves as a lasting reminder of your dedication and inspires you in your future research pursuits.

On behalf of the cohort, I would like to extend our deepest gratitude to everyone who guided us throughout the program. A special thanks to A/Prof Megan Wallace, Brenna Dempsey, the School BMedSc(Hons) coordinators, the School BMedSc(Hons) academic and support staff, the Course Management Committee, and all our supervisors for their unwavering support and guidance.

It has been an incredible privilege to serve as your student representative, and I look forward to graduating alongside you and becoming colleagues in the near future. I am confident that a bright future awaits each of us, and I sincerely wish you all the best as we continue to advance in our careers and beyond.

Seiyon Sivakumar, BMedSc(Hons) student representative
Medical Research Student Society (MRSS)

Alexa Yao

Reasons for Reduced Functional Capacity and Cardiac Risk

Supervisor Names and Institute Affiliations:

A/Prof Jai Darvall and Dr Earlene Silvapulle

Department of Anaesthesia and Pain Management, The Royal Melbourne Hospital
School of Public Health and Preventive Medicine, Monash University

Hi! My name is Alexa, and I completed my BMedSc(Hons) year with the Department of Anaesthesia and Pain Management at the Royal Melbourne Hospital between my fourth and fifth years of medical school. I chose to do an Honours year to set aside time for furthering my research skills and gaining a stronger understanding of research processes. My research project focused on perioperative medicine, aligning with my interest in anaesthesia.

Through the Honours year, I've had the opportunity to develop a range of research skills, including conducting literature reviews, participant recruitment, and data analysis. I've also had opportunities to join my supervisors in theatre and immerse myself in the vibrant research culture at The Royal Melbourne Hospital.

I'm incredibly grateful to my supervisors, peers, and the supportive research team for a year of invaluable learning opportunities. The Honours year has been a highly rewarding experience, and I would recommend it to anyone looking to experience something different from clinical placement or wanting to focus on building their research skills.

Feel free to reach out on Facebook or at alexayyao@gmail.com for any questions regarding the BMedSc(Hons) year.

ABSTRACT

Background

Postoperative cardiovascular complications are common, causing significant mortality and morbidity. Current risk prediction tools have variable accuracy, prompting interest in the inclusion of additional parameters such as functional capacity. Poor functional capacity is associated with an increased risk of postoperative cardiovascular complications, but has not improved predictive accuracy when combined with existing cardiac risk prediction tools.

The objective of this study is to investigate whether delineating between reasons for reduced functional capacity (cardiorespiratory versus non-cardiorespiratory) can improve its predictive accuracy for postoperative cardiovascular complications.

Method

We conducted a single-centre prospective cohort study, recruiting adults aged 65 years and over, undergoing elective intermediate-to-major non-cardiac surgery. Functional capacity was assessed using the Duke Activity Status Index (DASI) questionnaire, with reasons for functional capacity limitation identified in preoperative interviews. These reasons were categorised as cardiorespiratory or non-cardiorespiratory, and their impact on DASI scores and postoperative cardiovascular complications were analysed using multiple linear regression and logistic regression analyses.

Results

We recruited 70 participants during the study period. Non-cardiorespiratory reasons had the greatest impact on DASI scores; gait aid use and participant-reported weakness reduced DASI scores by 20.12 points (95% confidence interval [CI] 14.06–26.18) and 7.28 points (95% CI 1.35–13.20), respectively. Among cardiorespiratory reasons, only dyspnoea significantly impacted the DASI score, reducing it by 7.99 points (95% CI 1.81–14.18). Non-cardiorespiratory reasons were not associated with an increased risk of 30-day cardiovascular complications.

Conclusion

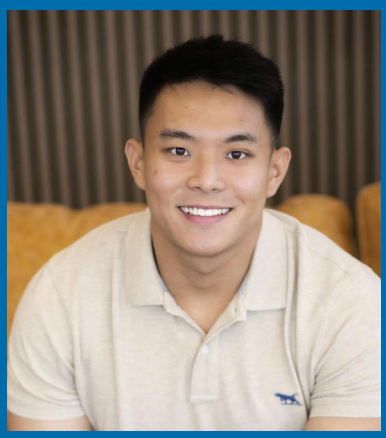
In this prospective cohort study, non-cardiorespiratory reasons (such as gait aid use) significantly lowered DASI scores, but did not correspond with an increased risk of postoperative cardiovascular complications. This suggests that cardiac risk prediction may be improved by differentiating between cardiorespiratory and non-cardiorespiratory reasons for poor functional capacity.

This is the first study to explore the impact of specific reasons for functional capacity limitation on DASI scores and postoperative cardiovascular outcomes. While these study findings require substantiation in larger studies, the inclusion of such reasons into cardiac risk assessment may improve the identification of high-risk individuals prior to surgery.

Aloysius Amos Lau

Validation of The Fresh Experiences Scale: Assessing The Experience of New Perspectives Under Psychedelics

Supervisor Names and Institute Affiliations:
Dr Paul Liknaitzky, Joshua Kugel
School of Clinical Sciences, Monash University



I chose to to pursue the BMedSci(Hons) after completing my fourth year in 2023 to explore my interest in mental health, particularly within the rapidly evolving field of psychedelic medicine. My passion for demystifying and destigmatizing the therapeutic use of psychedelics led me to an exciting research opportunity with the Clinical Psychedelic Lab at Monash University, where I had the opportunity to develop and validate a novel psychometric tool to quantify an underexplored aspect of the psychedelic experience.

Immersing myself in the intricate process of scale development has taught me the importance of achieving parsimony between empirical research and conceptual frameworks. This year also gave me the freedom to deepen my understanding of the various mechanistic accounts that underpin the therapeutic potential of psychedelic medicines.

This year has been a challenging yet rewarding learning experience, and I am immensely grateful for the opportunities and guidance I have received from my supervisors. My experience has helped me develop invaluable research skills and gave me the freedom to cultivate my passion and has left an indelible mark on my medical journey.

I'm happy to be contacted on alau0015@student.monash.edu.

ABSTRACT

Background

Psychedelic-Assisted Therapy has gained recognition for being a promising novel class of treatments for various psychopathologies. The strongest body of evidence currently points towards the acute subjective effects under psychedelics as the best predictor of long-term therapeutic outcomes. There are currently no measures to assess a commonly reported phenomenon of 'fresh experiences', which we define as a 'child-like' state under psychedelics, characterised by perceiving familiar thoughts and experiences with fresh eyes.

This study introduces the Fresh Experiences Scale (FES), a self-report instrument designed to measure 'fresh experiences'. The exploratory approach of this study aims to assess the psychometric properties of the FES by refining and evaluating the factor structure obtained from factor analysis.

Method

This study conducted a psychometric evaluation of the preliminary 51-item FES using an online survey of 410 participants. Participants completed a series of measures reflecting on their most recent or most memorable psychedelic experience. The sample was divided into an exploratory group (n = 260) to refine and uncover latent factors in the scale using exploratory factor analysis (EFA), and a confirmatory group (n = 150) for evaluating model fit using confirmatory factor analysis (CFA). Reliability analyses were conducted to evaluate the internal consistency of the scale, and test-retest reliability was assessed using a follow-up study (n = 120). Convergent and discriminant validity was assessed using correlation analysis of the FES against measures of conceptually similar and distinct constructs. Predictive validity was assessed using concurrent validity to determine the scale's ability to predict positive outcomes. Subgroup analyses were conducted to assess the scale's consistency across demographic variables.

Results

Factor analyses refined the FES to a 15-item scale with two dimensions: items that captured the cognitive reframing (Fresh Framing) and the feeling of heightened salience or richness (Fresh Feeling) associated with perspectival shifts, of seeing the familiar with fresh eyes. The goodness-of-fit analysis showed sensitivity to estimation methods. The overall scale demonstrated strong internal consistency ($\alpha = 0.93$) and test-retest reliability (ICC = 0.81).

Correlations with relevant measures confirmed convergent and discriminant validity of the FES. The FES was a significant predictor of improvements in positive mood ($r2 = 0.239$, $p < 0.001$), self-esteem ($r2 = 0.178$, $p < 0.001$), prosocial behaviours ($r2 = 0.207$, $p < 0.001$) and positive health-related behaviour changes ($r2 = 0.053$, $p < 0.001$). The FES also predicted reduction in negative mood ($r2 = 0.106$, $p < 0.001$) and problematic behaviours ($r2 = 0.059$, $p < 0.001$). Preliminary subgroup analyses found stability across age, gender and presence of previous psychiatric diagnoses.

Conclusions

Our initial findings suggest that the FES is a valid and reliable instrument that can be used in future clinical and non-clinical research for capturing the under-explored phenomena of gaining new perspectives under psychedelics. Future studies should cross-validate our findings in larger sample sizes and consider complex models based on the two-factor structure. The FES may be associated with long-term therapeutic outcomes and future research on clinical populations should be performed to cross-validate our findings and to establish its value in predicting therapeutic outcomes.

Angela Lin

Concordance and discordance of organ domain responses in SLE clinical trials: informing the development of a novel treatment response measure for SLE

Supervisor Names and Institute Affiliations:
Supervisors: Dr Rangi Kandane-Rathnayake, Dr Kathryn Connelly, Professor Eric Morand
School of Clinical Sciences at Monash Health
Sub-Faculty of Clinical and Molecular Medicine
Monash University

Hi, my name's Angela, and I completed my BMedSc(Hons) between my fourth and fifth years. If you'd told me in my first, second, or even third year of medicine that I would end up spending a year on research, I simply would not have believed you! However, I will be forever thankful that I decided to take the plunge, even with absolutely no background in research, because if there's one thing this year has taught me, it's that there is a place in research for everyone.

Confident that I was not seeking a project in a lab, I was not only happy to find a clinical research project in rheumatology, but also extremely lucky to work on it with my amazing supervisors. I shadowed lupus clinic every week, participated in the meetings of an expansive international lupus study, and was fortunate enough to have the opportunity to work on multiple publications. My honours year was enriching, inspiring and a change of pace from placement that I didn't realise I would appreciate to the degree that I did.

If you have any questions relating to a BMedSc(Hons) year, feel free to email me at alin0025@student.monash.edu!

ABSTRACT

Background

Current treatment strategies for systemic lupus erythematosus (SLE) are insufficient in controlling disease activity for most SLE patients. Deficits in current clinical trial outcome measures have been identified as a major factor impeding their development and the successful approval of new drugs. Treatment Response Measure for Systemic Lupus Erythematosus (TRM-SLE) is an ongoing global project attempting to address this issue by developing and validating a novel instrument designed specifically to measure improvement in disease activity for use in SLE clinical trials. This instrument aims to prioritise eight 'core set' domains of disease activity for detailed measurement that will determine treatment response in the TRM-SLE endpoint, however the impact of restricting to core set domains when defining clinical trial response is unknown.

Method

Data from two phase III clinical trials of belimumab for SLE were used (BLISS-52, NCT00424476; BLISS-76, NCT00410384). Disease features from the British Isles Lupus Assessment Group (BILAG) index were split into TRM-SLE core set domains and non-core set domains. Considering data at week 0 and week 52, we investigated concordance and discordance of baseline disease features and treatment responses stratified by core set vs non-core set status, at both a domain and patient level.

Results

At the organ domain level, we analysed 1684 patients with moderately to severely active SLE at baseline and week 52. Musculoskeletal (59.86%) and mucocutaneous (58.85%) domains were most commonly active at baseline. Organ domain treatment response rates at week 52 varied from 46.49% (haematological) to 88.52% (cardiorespiratory). At the patient level, this study was restricted to patients with known responder status at week 52, resulting in a total study population of 1526. 100 (6.55%) patients had entirely non-core set disease activity at baseline. The rate of treatment response measured using the traditional range of SLE disease features at week 52 was 48.43%. Core set treatment response rate at week 52 was 52.88%. 148 (10.38%) patients had discordant treatment responses using traditional definitions, but concordant treatment response or non-response using the core set definition. Non-core set haematological, vasculitis and general disease activity were identified as the most commonly discordant organ domains. Treatment response defined by the core set was aligned with traditional means in 69.00% - 89.63% of patients.

Conclusions

This post-hoc analysis supports the choice of core set domains included in the TRM-SLE instrument and suggests that the majority of disease activity and treatment responses in patients can be captured by a significantly smaller set of disease features compared to the standard outcome measures currently employed in SLE clinical trials. Most non-core set disease features that led to discordant results may be poorly suited to measuring treatment response (i.e. non-haemolytic anaemia, leucopoenia) and therefore were appropriately excluded, while some (i.e. vasculitis) were identified as domains that will need to be captured in the TRM-SLE endpoint via alternate mechanisms.

Mohamad Arbian Karim

A Systematic Review of Multi-Component Palliative Care Interventions in Patients with Interstitial Lung Disease: Unveiling the Critical Elements of Care

Supervisor Names and Institute Affiliations:
Dr Amy Pascoe (main supervisor)
Respiratory Research @ Alfred, School of Translational Medicine, Monash University, VIC Australia
Associate Professor Vidya Navaratnam (co-supervisor)
Centre for Respiratory Research, University of Western Australia
Associate Professor Natasha Smallwood (co-supervisor)
Department of Respiratory & Sleep Medicine, Alfred Health, VIC Australia
Respiratory Research @ Alfred, School of Translational Medicine, Monash University, VIC Australia
University of Melbourne

I'm a fourth-year medical student from the University of Indonesia completing my Bachelor of Medical Science (Honours) at Monash University. I chose to focus on doing a systematic review for palliative care interventions for interstitial lung disease because I wanted to learn how to summarize and critique scientific papers.

This project taught me invaluable skills in conducting systematic reviews, critically appraising research, and synthesizing complex clinical evidence.

My advice for future students: Choose a topic you're genuinely interested in, as it will sustain your motivation throughout the year. Don't be afraid to reach out to your supervisors and other researchers in the field if you need any help or guidance.

I'm happy to be contacted by future students about honours in this email: akar0085@student.monash.edu

ABSTRACT

Background

Interstitial lung disease (ILD) is a group of progressive and life-limiting illnesses that significantly impact patients' quality of life. Despite growing recognition of the need for palliative care in ILD management, access remains limited and patients continue to have substantial unmet needs. This systematic review aimed to identify and evaluate the effectiveness of multi-component palliative care interventions for people with ILD.

Method

A comprehensive search was conducted across six electronic databases (MEDLINE, Embase, Cochrane CENTRAL, CINAHL, PsychINFO, and Scopus) from 1987 to 2024. Randomized controlled trials, cluster randomized trials, and quantitative observational studies examining multi-component palliative care interventions for adults with ILD were included. Two independent reviewers screened studies, extracted data, and assessed risk of bias. The Template for Intervention Description and Replication (TIDieR) framework was used to describe intervention components.

Results

Fourteen studies (n = 3,354 participants) met the inclusion criteria, comprising five randomized controlled trials, seven retrospective cohort studies, one before-and-after study, and one mixed-methods study. Interventions varied widely but commonly included symptom management, advance care planning, and multidisciplinary care. Early integration of palliative care was associated with improved advance care planning, reduced healthcare utilization, and increased likelihood of home deaths. Quality of life outcomes were mixed across studies. Few studies reported on caregiver outcomes. The quality of evidence ranged from moderate to low, with limitations including small sample sizes and potential selection bias in observational studies.

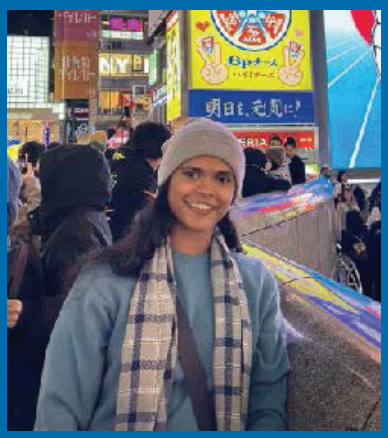
Conclusions

Our findings suggest that multi-component palliative care interventions, particularly those emphasizing early integration and interdisciplinary approaches, may improve several outcomes for people with ILD. However, the varying types of interventions and outcomes limits definitive conclusions. Future research should focus on standardizing outcome measures, examining long-term effects, and addressing caregiver needs. Efforts to implement and evaluate early, integrated palliative care models in ILD management are warranted.

Asvini Ketheeswaran

Oral versus Vaginal Misoprostol for Induction of Labour: An Individual Participant Data Meta-Analysis

Supervisor Names and Institute Affiliations:
Department of Obstetrics and Gynaecology, Monash University



I chose to do my Honours year at the Ritchie Centre with the Department of Obstetrics and Gynaecology at Monash Health. I was specifically drawn to this project because it focused on data analysis rather than lab-based work. This gave me the opportunity to develop a range of statistical analysis skills and techniques. For future students, I recommend having a clear vision of how you want your year to unfold and selecting a project that aligns with those goals. Consider the type of research you're interested in—whether it's clinical-based work or a particular area of study you want to explore. Feel free to reach out if you have any further questions.

ABSTRACT

Background

Induction of Labour (IOL) is a common obstetric procedure, performed to stimulate the onset of labour in individuals in whom this has not occurred naturally. Cervical ripening prepared the cervix for delivery by softening and stretching the tissue. Prior to IOL, cervical ripening methods may be necessary to increase the likelihood of a successful vaginal delivery. This can be achieved by pharmacological or mechanical methods. Misoprostol, a pharmacological agent can be administered in vaginal and oral forms for cervical ripening and IOL. The use of individual participant data meta-analysis (IPDMA) offers a larger sample size with statistical flexibility compared to a conventional meta-analysis.

Method

This meta-analysis registered with PROSPERO (CRD4202014111) in 2019. We have identified eligible randomised controlled trials (RCT) from a previous Cochrane Review (Oral misoprostol for induction of labour – Alfirevic et al.1) in 2014 and an updated search including any study published prior May 2021. RCTs comparing oral misoprostol to vaginal misoprostol for IOL, using any dosage, were eligible for inclusion. The authors of eligible studies were invited to contribute raw data for the analysis. The primary outcomes assessed were rate of vaginal delivery, and a composite of adverse maternal and neonatal outcomes. The rate of adverse maternal outcomes was calculated through a maternal infection, admission to the intensive care unit (ICU), uterine rupture and maternal death. Rate of adverse neonatal outcomes was calculated through a composite of a 5-minute APGAR score < 7, arterial umbilical cord pH < 7.1, admission to neonatal intensive care unit (NICU), severe respiratory compromise, seizures, neonatal infection, respiratory support, meconium aspiration syndrome and intrapartum/neonatal mortality. Trustworthiness of non-IPD studies was assessed through the Trustworthiness in Randomised Clinical Trials (TRACT) data integrity checklist.

Results

The results of IPDMA found 57 eligible studies: 12 shared IPD, two studies were excluded, leaving 10 studies included in the analysis. This equates to a total of 2430 participants. The study found that the effectiveness of oral and vaginal misoprostol was comparable, as was the rate of adverse maternal outcomes. There was an increased rate of adverse neonatal outcomes with the use of vaginal misoprostol (2.1% vs 3.9% Odds Ratio: 0.57, 95% Confidence Interval: 0.34, 0.96). This favours the use of oral misoprostol for IOL. The TRACT assessments of the 45 non-IPD sharing studies found 17 studies to be trustworthy, 23 studies to be untrustworthy and five studies were unable to be assessed due to only having an abstract. The results of the aggregate trustworthy and untrustworthy data found comparable rates of vaginal delivery, adverse maternal and neonatal outcomes.

Conclusions

Oral misoprostol is as effective as vaginal misoprostol for IOL in individuals with unfavourable cervices with cephalic singleton pregnancies. The use of oral misoprostol decreases the risk of poor neonatal outcomes. Oral misoprostol may be a safer than vaginal misoprostol in the context of IOL.

Don Nadhun Buthpitiya

Optimising the Flow of Placenta Pathology

Supervisor Names and Institute Affiliations:
Department of Obstetrics and Gynaecology, Monash University

I have always been passionate about Obstetrics and Gynaecology, though I initially lacked research experience in the field. Naturally, I chose a project at the Ritchie Centre in Obstetrics, as it aligned with my interests and offered a way to gain insights into research.

During my honours year, I learned a great deal, particularly that research often comes with unexpected challenges despite careful planning. These hurdles, while not always difficult, require flexibility and problem-solving. I also developed important research skills regarding statistical analysis, study design, and how to seek help when needed. This year provided a valuable break from clinical medicine, giving me time to reset after the intensity of fourth year.

For future students, I would recommend choosing a project based on what you want to gain from the experience. For instance, cohort studies and data analysis projects can offer flexibility, allowing you to work remotely without constant office visits. It's also important to understand the administrative aspects of research, such as patient recruitment and ethics approval, before starting. Being aware of these requirements early on can help reduce some of the unexpected hurdles and make the process smoother.

ABSTRACT

Background

The placenta is a 'window' into pregnancy, holding vital information for pregnancy related events. Namely, when investigating the causes of obstetric complications and unfavourable birth outcomes like stillbirth, pre-term birth, fetal growth restriction (FGR), placenta histopathology can be a useful tool. The clinical value of this test is optimised by its appropriate use by clinicians. Tests ordered must have appropriate indications and be delivered in a timely manner to be clinically useful to clinicians and their patients.

Aims

We first aimed to assess the current clinical utility of placenta histopathology regarding the time of the delivery of results and the rate of positive pathologies detected. We also aimed to audit the practices at Monash Health to understand if orders were appropriate and justifiable.

Methods

We conducted a retrospective cohort study of all births at Monash Health from January 1st 2023, to December 31st 2023. We then extracted the patients who had placenta histopathology tests conducted and categorised them into five key categories based on the indications for the test: stillbirth, pre-term birth, FGR, multiple pregnancy and chorioamnionitis. Patients were then analysed within groups for the odds of a positive pathology result based on the indication. We also assessed the timeliness of delivery of results and the appropriateness of the orders.

Results

Of the 3808 births at Monash Medical Centre, 788 had placenta histopathology conducted. There were 51 stillbirths, 508 pre-term births, 292 had FGR, 200 were indicated for multiple pregnancy and 84 for chorioamnionitis. The median time to result was 94 days. The odds of tests for stillbirth returning after greater than one month was 12.8 (95%CI 7.0 – 23.2, $p<0.001$) with a median time of 37 days. For those with pre-term birth, with gestations between 32 to 36+6 weeks, there was a 40% reduction in the odds of a positive pathology (OR 0.6, 95%CI 0.4 - 0.8, $p<0.001$), with a median time to result of 92 days. Whilst, for gestations between 22 to 31+6 weeks there was an odds ratio of 2.2 ($p<0.001$), for a positive pathology. Patients indicated for FGR and Severe FGR had a median result time of 94 days and 61 days respectively, with the odds of a positive result being 1.6 (95%CI 1.0 – 2.5, $p<0.037$) and 2.2 (95%CI 1.6 – 3, $p<0.001$) respectively. Multiple pregnancy had a median result time of 94 days, with the odds of a positive pathology being 0.53 ($p<0.001$). For chorioamnionitis, the median result time was 72 days, coupled with 120% increased odds of a positive pathology (95%CI 1.6 -3.1).

Conclusion

Our study found that the current practices at Monash Health are ineffective and inefficient. This study has found that there is over testing and unnecessary orders for indications such as pre-term birth (between 32 to 36+6 weeks), multiple pregnancy and chorioamnionitis. Due to this, the tests ordered are more likely to return greater than one month, reducing the clinical value of the test.

Christina Ni

Studying the Benefits of One-to-One Neonatal Resuscitation Video Review Sessions for NICU Staff Over time: A Qualitative Assessment of a Longitudinal Intervention

Supervisor Names and Institute Affiliations:
Dr Douglas Blank
A/Prof Arunaz Kumar
1. **Department of Paediatrics, School of Clinical Sciences, Monash University**
2. **Monash Newborn, Monash Health, Clayton**

Hi, I'm Christina. I have always loved the fields of paediatrics and obstetrics and gynaecology, so I was so excited when I came across the opportunity to do research in neonatology. I felt that this would be the perfect intersection of my interests.

It was super important to me that my honours year was dynamic and led by me. I also wanted to stay connected with clinical medicine, so I prioritised seeking out clinical experience. My project at Monash Children's Hospital gave me the freedom to shape my days however I wanted—whether it was attending births, joining in on postnatal ward rounds, or even participating in neonatal resuscitations.

I really enjoyed the qualitative aspect of my project, and my honours year really showed me how interesting and creative research can be.

I am happy to be contacted by future students for advice, especially for those interested in a project in neonatology.

ABSTRACT

Background

Neonatal resuscitation is a common medical intervention required to support an infant's physiological adaptation to extrauterine life. International recommendations indicate that newborn resuscitation providers should have relevant current knowledge, technical and non-technical skills. Recommended programs to achieve this include feedback from different sources, simulation training and objective, performance focused debriefings- most of which are already regularly implemented in practice.

Neonatal Resuscitation Video Review (NRVR) is an emerging tool for ongoing education and professional development. Resuscitation providers watch videos of real neonatal resuscitations and highlight areas for improvement. Studies have demonstrated that learners find NRVR to be a safe and beneficial educational tool. There are currently no published studies evaluating the impact of a long term one-to-one NRVR coaching program for NICU staff. Our aim is to qualitatively evaluate the impact of one-to-one NRVR coaching sessions for learners over time, with learners reviewing their own videos.

Method

Doctors and nurses who regularly attend births were asked to carry video cameras and record neonatal resuscitations. Suitable videos for teaching were processed and one-to-one coaching sessions were then arranged with either a consultant neonatologist or nurse educator. Three coaching sessions were organised a minimum of one month apart. Learners participated in semi-structured interviews after their first and final coaching session to evaluate their experience of NRVR.

Results

Eight clinicians (6 doctors and 2 nurses) completed their first coaching session and interview and were included in this initial qualitative analysis. Due to the longitudinal study design, the study is still ongoing. All participants have voiced positive experiences and educational benefits with their one-to-one coaching session. Initial qualitative analysis revealed four themes - (1) - Video recording providing an accurate account of resuscitation events –Learners described an inverse relationship between the intensity of a neonatal resuscitation and their capacity to remember details of what occurred. The videos provided an objective overview perspective of the resuscitation, showing team dynamics and how learners' resuscitative actions both physically and physiologically impacted the neonate. (2) - Lessons from one-to-one coaching- Learners were able to explore their own learning trajectories in a meaningful way and appreciated the personalised feedback. (3) - Practice Changes- Utilising the video, coaches and learners visually identified specific areas for improvement, and learners were able to clinically upskill as a result. (4) - Considerations in learner psychological safety- Learners experienced differing levels of comfort watching themselves perform resuscitations, dependent on factors such as resuscitation outcome, familiarity with their coach and a fear of assessment. All learners reported that the education benefit of NRVR superseded these anxieties.

Conclusions

So far, learners find NRVR to be a psychologically safe and effective educational tool. The one-to-one format is especially useful for personalised feedback and the results support the continued implementation of NRVR.

Cyrus Raki

Comparative Evaluation of the Spetzler-Martin and Supplementary-Grading Methods in Predicting Postoperative Outcomes Following Brain Arteriovenous Malformation Surgery

Supervisor Names and Institute Affiliations:
Associate Professor Leon Lai, Department of Neurosurgery, Monash Health

I decided to undertake an honours year after completing Year 4C in 2023. I did not have the opportunity to get involved in research during my clinical years and so I was interested in completing a full research focused year. I was interested in the field of neurosurgery and so chose to complete a project involving the fascinating topic of brain arteriovenous malformations. Looking back now, this decision to complete an honours year has truly been a rewarding one. This year provided me the opportunity to learn about the research process and develop skills that are not only useful for my current project but also can be applied for all future research pursuits. There are definitely obstacles and challenges that arise when conducting research, and this year has also taught me a great deal with regards to tackling these problems. Overall, I believe an honours year is a great opportunity for developing research skills and furthering your knowledge and passion in a field that you are interested in. I highly recommend anyone interested in research to reach out to supervisors and discuss projects that you may wish to pursue for an honours year. Please feel free to contact me at crak0003@student.monash.edu.

ABSTRACT

Background

Brain arteriovenous malformations (AVMs) are composed of abnormal connections between the arterial supply and venous drainage system without an intervening capillary bed. The Spetzler-Martin (SM) grading system is the most widely used classification scheme for AVM surgery, and scores lesions based on size, venous drainage pattern, and eloquence. However, it overlooks key patient and AVM factors that influence surgical risk. To address this, Lawton and Young introduced the Supplementary-Grading (Supp-SM) system, which adds three variables: patient age, AVM rupture status, and AVM compactness. Despite its introduction, limited data and a lack of consensus exist on which grading system better guides surgical decision-making.

Aim

To compare the accuracy of SM and Supp-SM grades in predicting functional outcomes following brain AVM surgery and determine an appropriate Supp-SM grade cut-off for selecting optimal surgical candidates with lower associated operative risk

Method

A retrospective analysis was performed on consecutive patients who underwent brain AVM microsurgery, with or without preoperative embolization, at Monash Health from July 2015 to June 2024. Patients were excluded if they received embolization monotherapy, radiotherapy, or haematoma evacuation only. Data was collected retrospectively through institutional medical records. The primary outcome measure was evidence of postoperative morbidity which was defined as a downgrade in Modified Rankin Scale (mRS) score at 90-days post-operation, with secondary outcome measures consisting of angiographic result and radiological evidence of parenchymal infarction post-intervention. Area Under Receiver Operating Characteristic (AUROC) curve analysis was conducted to compare the accuracy of the grading methods in predicting postoperative morbidity and Spearman's p was used to evaluate the correlative power between grading method and the change in mRS score at 90-days.

Results

A total of 96 cases met the inclusion criteria, with 84 patients undergoing microsurgery alone and 12 receiving preoperative embolization. The median age was 44.8 years, with SM grade II and Supp-SM grade 5 being the most common. The complete AVM obliteration rate was 97.9%, while 14.6% of patients showed radiological evidence of infarction post-treatment. The AUROC scores for SM and Supp-SM were 0.717 (95% CI 0.55-0.88) and 0.667 (95% CI 0.46-0.88), respectively ($p = 0.3899$). Supp-SM grades (Spearman's $p = 0.280$, $p = 0.006$) were more strongly correlated with 90-day mRS score changes than SM grades (Spearman's $p = 0.151$, $p = 0.142$). A Supp-SM score of 6 was linked to a 22.7% (95% CI 5.2 – 40.2%) risk of postoperative morbidity, with unfavourable outcomes occurring in 3.2% of patients with Supp-SM < 6 and 20.6% with Supp-SM ≥ 6 ($p = 0.009$).

Conclusion

This study found no significant difference in the accuracy of SM and Supp-SM methods for predicting postoperative morbidity. However, Supp-SM grades showed a stronger positive correlation with changes in the 90-day mRS score. Patients with Supp-SM scores below 6 were associated with a significantly lower risk of unfavourable postoperative outcomes, indicating its potential utility in selecting lower-risk surgical candidates.

Dhara Seneviratne

Predicting the Likelihood of Early Coronary Revascularisation in a Suspected Acute Coronary Syndrome Population, in the Era of Machine Learning

Supervisor Names and Institute Affiliations:
Prof Derek Chew – Monash Heart, Victorian Heart Institute, Victorian Heart Hospital, Monash University
Dr Ehsan Khan – Flinders Medical Centre

After the intensity of fourth year, I was eager to take a breather from clinical medicine and explore new skills. That's why I chose to undertake my BMedSc (Hons) at the Victorian Heart Hospital. This year has been immensely fulfilling, offering me the opportunity to delve into research, hone my writing skills (whether for papers, manuscripts, or those countless crucial emails), and gain experience working in large medical teams outside of the clinical setting.

Honours has been challenging, humbling, and immensely gratifying. I took on a project heavily reliant on coding, despite my IT skills being minimal, to say the least. However, it has allowed me to learn a great deal—not just about cardiology, but also about coding, statistics, and it gave me the opportunity to collaborate with some truly exceptional and talented individuals.

Doing honours has been a sometimes surprising, but always rewarding gift – and I'm incredibly grateful for the experience. It has definitely been a steep learning curve, but the skills and people I've met through this year has made the experience thoroughly worth it.

Feel free to reach out if there's any questions!
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ABSTRACT

Background

Accurate discrimination of patients who require early coronary revascularisation from a suspected acute coronary syndrome (ACS) population is challenging and relies heavily on coronary angiography. Alternatives, such as CT coronary angiography (CTCA) are safe, cost-effective and more readily available and may be suitable for low-moderate risk patients. Angiographic procedures that do not lead to early revascularisation are invasive and resource intensive. Thus, we aimed to develop and evaluate machine learning (ML) and logistic regression models to predict which ACS patients need early revascularisation in emergency departments (EDs) and to help guide urgent angiography referrals.

Methods

Prospectively collected data from 14,131 suspected ACS patients across 12 South Australian hospitals was analysed. Two logistic regression models were developed in Stata 18.1 to predict early revascularisation, with the second model incorporating a ML indicator for Type 1 myocardial injury (T1MI). ML models, including Random Forest, Neural Network and Extreme Gradient Boosting, were developed in TensorFlow 2.17.0.

Results

The analysis included 10,470 participants, with 7329 in the training set and 3141 in the testing set. The logistic regression models achieved AUCs of 0.853 ± 0.3% and 0.902 ± 0.1%, while a Neural Network model reached an AUC of 0.939 ± 0.2% for predicting revascularisation. Using the model, cost analysis showed that implementing CTCA for patients with moderate T1MI suspicion could increase the angiography-to-revascularisation rate by 25% and conservatively save approximately $ 29,747 across sites by avoiding 189 unnecessary angiograms.

Using a ML model to more accurately select patients for early angiography could reduce rates of recurrent myocardial infarction and cardiovascular mortality within 6 months from 8.0% to 3.5% (p=0.02).

Conclusions

Logistic regression and ML models can help predict revascularisation needs in EDs, supporting safer, cost-effective decisions. While their use may reduce recurrent MI and cardiovascular mortality, external prospective validation is needed to assess clinical impact

Edwin Xu

The Association Between Changes in Peri-coronary Adipose Tissue, Epicardial Adipose Tissue and Coronary Plaque on Computed Tomography Coronary Angiography After Coronary Calcium-Guided Statin Therapy in Intermediate Risk Patients with Family History of Coronary Artery Disease

Supervisor Names and Institute Affiliations:
A/Prof Nitesh Nerlekar, Dr Andrew Lin
Victorian Heart Hospital, Melbourne
Monash University, Melbourne

I chose to undertake a BMedSc (Hons) after completing 4th year in 2023. Having no prior research experience, I was keen to explore the world of medical research after two years of clinical placement. The honours year was also a great opportunity to simultaneously my interest in cardiology in a data-based project. My experience at the Victorian Heart Hospital has been amazing, and I would definitely recommend choosing a project here to future prospective students for its unique blend of learning opportunities!

Whilst the honours year presented profound obstacles at times, this also provided opportunities for great personal growth. This was only possible because of my supervisors, and I am incredibly grateful for their expertise, guiding me through the project and providing critical insights. I have also been deeply inspired by my supervisors and can now clearly envision myself following the pathway of medical research into the future.

I can be contacted at edwin.xu1507@gmail.com or you can message me on Facebook if you'd like to chat about the honours experience at the VHH!

ABSTRACT

Background

Peri-coronary adipose tissue (PCAT) attenuation is a novel radio-marker that could enhance individual patient-level cardiovascular risk stratification. PCAT attenuation has been associated with increased adverse event risk in post-acute coronary syndrome, higher-risk or symptomatic patients with suspected CAD. However, PCAT has not been studied in low-intermediate risk patients and has also not been well-correlated with plaque burden and progression. Thus, its potential value as a screening tool is uncertain.

Method

This study performed post-hoc analysis of the CAUGHT-CAD trial, which investigated asymptomatic, intermediate risk (annualised risk 0.4–3%), statin-naïve patients with a family history of premature CAD. Patients with coronary artery calcium score (CACS) between 0–400 were randomised to CACS-guided (atorvastatin 40mg/daily and nurse-led tailored lifestyle intervention) and usual care groups. Computer tomography coronary angiography (CTCA) was performed at baseline and 3-year follow-up. PCAT attenuation and volume across three major coronary arteries were quantified by semi-automated artificial intelligence software, alongside plaque volumes, and epicardial adipose tissue (EAT) attenuation and volume. Associations between PCAT, EAT and plaque were analysed across patient groups with t-tests and linear regressions.

Results

213 patients (mean age 59.3 ± 6.5 years) were analysed; 103 in CACS-guided and 110 in usual care groups. Change in PCAT attenuation at 3 years was not significantly different between groups (1.24 ± 8.33 vs –1.09 ± 8.12 HU, p = 0.222), despite a significant reduction in total and non-calcified plaque progression (total: 13.59 ± 23.70 vs 22.93 ± 38.05mm3, p = 0.041; non-calcified: 3.0 ± 22.4 vs 10.6 ± 28.6mm3, p = 0.039). Both baseline and 3-year change in PCAT attenuation did not significantly predict plaque progression (baseline: ß coefficient = 0.196, p = 0.22; change: ß coefficient = –0.016, p = 0.34), both with and without adjustment for baseline plaque and risk factors, such as age, blood pressure and cholesterol. The different between plaque progression in patients above and below the threshold PCAT attenuation of –70.1 HU was not significant (20.34 ± 36.62 vs 16.80 ± 27.87mm3, p = 0.442). Changes in PCAT and EAT attenuation were significantly associated in the CACS-guided group (ß coefficient = 0.441, p = 0.04), but not in the usual care group (ß coefficient = 0.188, p = 0.381).

Conclusions

PCAT attenuation does not appear to predict changes in plaque in an intermediate risk asymptomatic cohort. Both baseline and 3-year changes in PCAT attenuation, were not associated with plaque progression (both total and non-calcified). Changes in PCAT appears to be more strongly associated with changes in EAT. Whilst a CACS-guided statin prevention approach significantly reduced total and non-calcified plaque volume, it does not cause a significant reduction in PCAT attenuation.

Elena Vianca

Effects of Valproic Acid on p300-related transcription factors: a potential contributor to mechanism of teratogenicity

Supervisor Names and Institute Affiliations:
Dr Alison Anderson
Dr Ana-Antonic Baker
Prof Terence O'Brien
Department Of Neuroscience, School Of Translational Medicine
Monash University

Hi I'm Elena, I'm one of the 4th year medical students from University of Indonesia. My project is on bioinformatics / stem cells and I chose this project because it gave me the opportunity to be involved in all the aspects of research from learning lab molecular biology techniques, to analysing gene expression data (learning how to code in R). Because one of my supervisor is a clinician, I also had the opportunity to go shadowing at the epilepsy clinic and neuro department which gave me insights to how the drug I'm researching is used in clinical practice.

My research is a basic science research and I didn't have much experience/knowledge on stem cells, molecular biology, or genetics before taking on this project. It was very challenging at first, facing very steep learning curves. But I am very grateful to have such a wonderful supervision team who are very supportive while I navigate these hurdles and grow in ways I hadn't anticipated. By the end of it I not only gained a deeper understanding of my research field, but also a sense of confidence in ability to learn and adapt in new environments.

I really did gain first hand experience of what research is like (including the yucky parts like experiments failing, cells dying and being uncertain on what the results are going to be like) but overall this honors year has really made me rediscover my love for science and learning.

Tips for future students: definitely take your time to talk with your potential supervisors and get to know them. Ask about their supervision style and expectations, whether your expectations align with theirs.

I'm happy to be contacted if you have any questions :)
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ABSTRACT

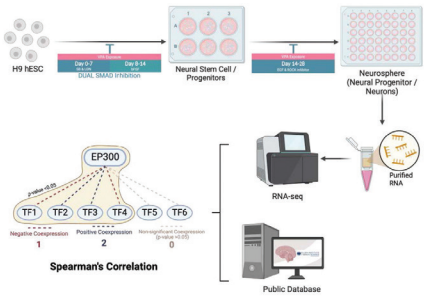
Background

Unfortunately, I haven't finished my thesis at the time of submission for this but here is a short description and a diagram of my methodology :(

Valproic acid (VPA) is a first line antiepileptic for generalized epilepsy but it's use in women of childbearing age is limited due to it's teratogenic effect. One of VPA's hypothesized mechanism of causing this effect is through broad dysregulation of gene expression.

This project builds on evidence from a previous study conducted by our research group which found variants within transcription factor binding sites (TFBS) of 64 genes linked to 20 birth defects were predicted to alter TF binding related to EP300. EP300 is the gene that codes for p300, a master regulator of gene expression that affect the expression of thousands of genes crucial for fetal development. These variations in TFBS associated with EP300 complexes may affect response to VPA and therefore risk for teratogenicity. This implies that variations in EP300 TF complex plays a role in regulating gene expression involved in pathogenesis of congenital malformations and neurodevelopmental defects associated with VPA.

Method



Conclusions

Valproic acid alters the co-expression profile of EP300 and that this may explain the broad gene expression dysregulation which is hypothesized to contribute to it's teratogenic effects. The teratogenic mechanism of valproate is likely to be very complex, involving multiple pathways that contribute to it's impact on fetal development. Understanding the multifaceted processes of how VPA affects fetal development requires further investigation. This study provided support that upstream gene expression regulatory elements such as EP300-TF complexes likely plays a role in the mechanism of valproate-induced teratogenicity.

Ernest Hung

Impacts of perceived stress on cognitive functioning in complex PTSD

Supervisor Names and Institute Affiliations:
Dr Eveline Mu, Professor Jayashri Kulkarni AM
HER Centre Australia, Department of Psychiatry
Monash University

Hi, I'm Ernest. I decided to undertake an Honours year after 4th year in medicine because I was keen to experience what a year-long research project would feel like. I'm passionate about psychiatry with a special interest in trauma and trauma-related disorders, which led me to this research project on complex post-traumatic stress disorder.

I'm most grateful for all the lovely people I met this year, especially my peers at HER Centre Australia. These wonderful people have made this challenging year more manageable and less isolating. And, yes, undertaking BMedSc(Hons) is not easy, but I also acquired and honed some really valuable knowledge and skill sets. I have learned a lot about academic writing, data analysis, time management, critical thinking, and many more. Having this experience would help future doctors practise evidence-based medicine.

Taking an extra year to conduct a research project is by no means a decision to make lightly, especially for students burdened by various concerns. Please feel free to contact me at ehun0007@student.monash.edu if you have any questions. Particularly, I'm more than happy to share my thoughts on conducting clinical or human research in BMedSc(Hons) and my experience as an international student.

ABSTRACT

Background

Complex post-traumatic stress disorder (c-PTSD) is a recently introduced psychiatric disorder. The main symptoms of c-PTSD include re-experiencing, avoidance, hypervigilance, disturbed self-concepts, affective dysregulation, and relationship difficulties. There is emerging evidence that cognitive deficits are prevalent in c-PTSD, and cognitive deficits mediate functional impairment. At the same time, perceived stress is a known risk factor for developing cognitive deficits, such as executive dysfunction and memory deficits. Unfortunately, given the recency of the diagnostic definition of c-PTSD, there exists a paucity of research on perceived stress and cognitive deficits in c-PTSD. It is pivotal to study how cognitive functioning may be impacted by perceived stress in c-PTSD, as high perceived stress and poor cognitive functioning are both implicated in impaired psychosocial functioning. Investigating how perceived stress impacts cognitive functioning can contribute to a better understanding of c-PTSD and pave the way for developing more targeted treatments.

Objective

The current study aimed to compare executive functioning, i.e., working memory, inhibitory control, and cognitive flexibility, in low perceived stress versus high perceived stress in c-PTSD. The second aim was to compare episodic memory functioning in low perceived stress versus high perceived stress in c-PTSD.

Methods:

This cross-sectional, observational study was affiliated with the Alison Project, a clinical trial at HER Centre Australia, and available participant data were used. Participants with c-PTSD were split into high perceived stress and low perceived stress groups according to the median score of the Perceived Stress Scale-10. Neurocognitive battery included the Classic Stroop, One-back Task, and International Shopping List Test (ISLT). The inhibition task and inhibition/switching task in the Classic Stroop measure inhibitory control and cognitive flexibility, respectively. The One-back Task measures working memory, while the ISLT measures verbal episodic memory.

Results

Participants with high perceived stress performed significantly worse in the Classic Stroop inhibition/switching task, reflected by a significantly longer completion time ($p = 0.044$). Covariates (i.e. comorbid social anxiety, generalised anxiety disorder and post-traumatic stress disorder) did not contribute significantly to the difference in the inhibition/switching task. Performance in inhibitory control, working memory and episodic memory did not seem to differ between the two perceived stress groups.

Conclusion

The finding in the inhibition/switching task supports previous literature that reported worse set-shifting/cognitive flexibility in high perceived stress. However, working memory, inhibitory control and episodic memory did not seem to be worse in high perceived stress. Of note, we postulate that c-PTSD is inherently coupled with elevated perceived stress, which might have lessened the difference in cognitive performance between high and low perceived stress groups. A few limitations have also been noted, portraying a need for further research to expand the evidence base. Notably, future research should examine if high perceived stress in c-PTSD is related to disproportionate deficits compared to controls. A need for greater focus on stress and cognition in c-PTSD is highlighted, given their potentially harmful impacts on individuals experiencing c-PTSD.

Farhan Alga Rahadiansyah

Understanding Vaping Intention of Monash University International Students and Opportunity for Health Promotion to Stop Vaping

Supervisor Names and Institute Affiliations:
A/Prof Chris Barton, Melis Selamoglu
Department of General Practice, School of Public Health and Preventive Medicine

Hello, my name is Farhan. I am an international student from Indonesia. I had the opportunity to undertook my Honours project at Department of General Practice under the supervision of A/Prof Chris Barton and Melis Selamoglu. I chose my project because e-cigarette lately becoming a very trending topic among younger age group and also among the social environment around me as well. At first, I was not too bothered by e-cigarette but as time pass by I feel it's becoming more common and it concerns me because people are using it a lot more.

When I started it was pretty difficult for me because it was my first time conducting a qualitative research. My advice is that if you have a difficulty with something or you don't understand something, don't forget to ask for directions and advice from your supervisors because they are with you to help you. I find my supervisors really lovely and helpful, they are a big reason I was able to finish my research and I also gained a lot of knowledge from them.

If you want to ask me anything, feel free to contact me via:
farhanalga1@gmail.com

ABSTRACT

Background

Previous research from our group identified more than one in four university students report 'ever' having used an e-cigarette (25.9%) and 7.8% of international students report using e-cigarettes daily. This work established that international students were more likely to seek health information about e-cigarettes from less reputable sources compared to domestic students, suggesting the need for tailored strategies to deliver health information about e-cigarettes to this group.

Method

A qualitative descriptive research design was used incorporating focus groups with Monash University international students and interviews with key stakeholders from clinical and service staff members at the University Health Services (UHS), Monash Residential Services (MRS) and Monash University International Student Services (MUISS). Focus groups and interviews were used to understand how health information could be delivered effectively to Monash University international students.

Interview guides were constructed for focus groups and interviews based on the findings of a state-of-the-art review of literature and incorporating concepts from the Theory of Planned Behaviour and Health Belief Model. In constructing these interview guides the researcher also included feedback and suggestions given by stakeholders from the UHS and MUISS. Focus groups and interviews were audio recorded and transcribed verbatim. Reflexive thematic analysis was used to develop themes and understand the perspectives and needs of international students as well as opportunities to disseminate health promotion messages about vaping to these groups.

Results

Vaping was seen as widespread by international students who were concerned about the harms of vaping. Perhaps the clearest opportunity for intervention is through wellbeing programs offered at orientation for international students. The health services can influence this material and provide resources for students to access to be aware of university policy about vaping and the harms associated with vaping. Similarly, ensuring international students are aware of services at the UHS is an important need as students may have limited access to other primary care services while studying in Australia. Clinical staff at University Health Service require training and support to be confident in asking international students about vaping and providing support and referral to students who are vaping and want to stop.

Conclusions

There is an important need and opportunity for Monash University to support international students' health and wellbeing by raising awareness of the health harms of vaping amongst this group and providing clinical services to support students who want to quit vaping. To our knowledge this research is the first to specifically explore the needs of university international students in this area. There is opportunity for the University Health Services to work closely with other social and wellbeing bodies on university campuses to raise awareness of the health harms of e-cigarettes and provide supportive and accessible referral pathways for international students who want to quit vaping.

Georgia Lyras Musgrave

Presentation with Decreased Fetal Movements: prevalence, characteristics and outcomes.

Supervisor Names and Institute Affiliations:
Department of Obstetrics and Gynaecology, Monash University

Hi, my name is Georgia, and I completed my BMedSc after completing year 4C. It was a privilege to work with the Department of Obstetrics and Gynaecology at Monash Health in conjunction with the Hudson Institute of medical research and The Ritchie Centre. I chose my project because of a broader interest in O&G, and because I wanted to understand more about the process of conducting research. This year I've learnt a lot about ethics applications, collecting and analysing data and effective scientific communication.

Please feel free to contact me with any questions at glyr0002@student.monash.edu or find me on facebook.

ABSTRACT

Background

Decreased Fetal Movements (DFM) is a subjective clinical presentation based on maternal awareness of fetal activity. DFM has been linked to poor outcomes including growth restriction and stillbirth. Pregnant people are encouraged to monitor fetal movements in the third trimester as a reflection of fetal wellbeing. The gestation of DFM presentation and number of presentations may translate to clinical risk, however, DFM research prior to 28 weeks is lacking. Adequate management represents an opportunity to intervene in at- risk pregnancies, however, balancing investigations ordered, frequency of follow-up, timing of delivery, risks associated with pre-term and early term birth and induction of labour (IOL), is complex.

Aim

The aim of this project is to better understand the characteristics, risk factors, and pregnancy outcomes of those presenting with DFM compared to those who do not, while also exploring the prevalence, frequency, and gestational age at DFM presentation, and outcomes in these subgroups.

Methods

The project was a retrospective cohort study of people who delivered at a major tertiary maternity centre in Victoria from January 2021 to December 2023. The DFM group was defined as people who presented to the hospital's maternity ward for evaluation and assessment of DFM within the same period. The population was singleton pregnancies who delivered from 20 weeks. Exclusion criteria included unbooked pregnancy, transfer, termination of pregnancy, multiple pregnancy, and major congenital abnormality. Maternal characteristics and pregnancy outcomes were compared between people who presented with DFM and those who did not. The primary outcome was a composite adverse perinatal outcome defined as Apgar <7 at 5 minutes, arterial cord lactate >7.5 mmol/L, growth <10th centile, NICU admission, hypoxic ischaemic encephalopathy, stillbirth and neonatal death.

Results

Following exclusions 8587 pregnancies met the criteria for the study. Of these, 2971 (34.6%) pregnancies were complicated by DFM. People presented with DFM an average of 1.48 times at a mean gestation of first presentation at 33+1. 18.27% of first DFM presentations occurred before 28 weeks. Pregnant people with DFM were more likely to be primiparous, younger, and have a higher BMI. Social factors that predict DFM presentation included birth outside Australia, interpreter use, and socioeconomic status. There was no difference in the primary composite outcome between the DFM and no DFM groups (aOR 1.02 (95% CI 0.93- 1.11)). DFM was associated with higher rates of IOL (1.24 (1.18-1.31)), emergency caesarean section (1.18 (1.08-1.29)), and post-partum haemorrhage (1.08 (1.01-1.14)). In pregnancies with multiple DFM presentations, rates of IOL were higher than those with a single DFM presentation. Earlier gestation of DFM presentation was associated with higher rates of the primary composite outcome compared to term.

Conclusion

The prevalence of DFM is increasing, however, DFM presentation is largely predicted by social factors. Concerningly, some subgroups at increased risk of stillbirth are paradoxically less likely to present. There may be increased risk associated with earlier gestation of first DFM presentation, however, prospective studies are required to confirm this association. Future cost analysis may be beneficial to balance the risks and benefits of DFM management and public health messaging.

Hugh Farrell

Demographic, Usage and Behavioural Markers of Sports Gambling Related Harm in Australia

Supervisor Names and Institute Affiliations:
Primary supervisor: Dr Daniel Bennett; School of Psychological Sciences, Monash University
Co-supervisor: Dr Dan Myles; Australian Gambling Research Centre

I completed Year 4C in 2023 and subsequently conducted my Honours this year. I chose my project due to having a keen interest in sport and being appalled at the current state of gambling overall in Australia, as well as the specific circumstances regarding the conflicts of interests of sporting and media bodies in relation to sports gambling specifically. I learnt a lot during this year in relation to gambling as my area of study, as well as general research principles that I hope will stand me in good stead in the future when analysing the vast medical literature. However, ultimately I had a great year because of my supervisors and really enjoyed being able to broaden my studies into the world of psychology that I otherwise would not have had the chance to experience.

ABSTRACT

Background

Australians suffer the world's highest per capita gambling losses, and it is a significant societal issue causing wide-ranging harm. Sports/race betting is one of the fastest growing gambling subtypes in Australia and also has many structural characteristics that increase the risk for harm. As such, it merits further investigation into the markers of gambling harm to allow the identification of individuals at high risk, as well as allow enhanced and targeted regulatory and public health measures to be implemented in the future.

Method

Our study was an exploratory case-control study that compared a group of individuals at high risk of gambling harm (PGSI 5+) with a low-risk matched control group (PGSI 0-4). There was a two-phase recruitment protocol where participants were recruited via the online research platform Prolific and completed an initial screening survey (phase 1; N = 1600). Those eligible then completed a demographic and gambling usage questionnaire and behavioural task (phase 2; N = 169). The initial screening survey asked participants demographic questions (age, gender, self-perceived socioeconomic status (SES)) as well as frequency of sports betting and the Problem Gambling Severity Index, which is a self-reported screening measure of gambling related harm. They were eligible to be invited back if they gambled on sports/races at least monthly and were deliberately matched for age and gender, and serendipitously matched on education, subjective SES and employment. The 169 participants then completed a more detailed demographic and gambling usage questionnaire and finally the behavioural task, which was an online simulated game of blackjack. Chi square tests of independence and Mann Whitney U tests were used in our data analysis.

Results

The PGSI 5+ group had a significantly higher frequency of the following sports/race betting usage features compared to the PGSI 0-4 group: in-play bets, cash out, responding to deposit offers and watching live sports/races in gambling apps. They also had a higher overall gambling and specifically sports/race betting frequency, a greater number of sports/race betting accounts, an increased frequency of impulsive betting, greater monetary losses and were more likely to have their sleep affected by their sports/race gambling. Both groups demonstrated a higher frequency of outside bets when using bonus bets. No demographic features differed significantly between groups. The only significant behavioural marker was that the PGSI 5+ group had a significantly higher bet variability.

Conclusions

Our findings demonstrated that in demographically matched Australian regular sports/race bettors it was primarily the gambling product features we investigated that were associated with higher levels of gambling related harm, as opposed to demographic markers, the behavioural markers measured in the blackjack task or the circumstances in which people bet. The specific usage markers we found will be useful for future research, allow targeted detection of at-risk gamblers and provide evidence for regulatory improvements.

Isabel Tsintsiper

The Effects of Serotonergic Psychedelics on Neural Functon

Supervisor Names and Institute Affiliations:
Professor Nigel Jones – School of Translational Medicine, Monash University
Dr Sasha Gartside – Newcastle University (UK)

I was lucky enough to do my honours project as part of the Colin Ingram Travel Award. This meant that I was part of the collaboration between Monash University and Newcastle University, and I spent 7 months living in the UK. Living in the UK whilst completing my honours was the best year of my life. The ability to make new friendships and travel around Europe whilst doing research in neuroscience was truly the most incredible experience. I am so grateful for Monash and Newcastle University for providing this opportunity.

My research involved looking at how serotonergic psychedelics impact neural function. Whilst I had never done any electrophysiology before, this project taught me so many new skills. Doing an BmedSci honours was no doubt a steep learning curve, and challenging at times, but it was so interesting to learn so many new skills.

My advice for future students would be to push yourself out of your comfort zone, learn some incredible new skills, and open yourself up to new life experiences. If you have any questions about the program, or doing an honours abroad, please feel free to contact me!

ABSTRACT

Background

Depression is a common mental health condition, affecting one in five Australians. Current treatment options are often limited by delayed onset, side effects, the need for prolonged administration, and lack of efficacy in some patients. Recently, serotonergic psychedelics (drugs with 5-HT2A receptor agonist properties) have shown promise as antidepressants in clinical studies. A key proposed mechanism of action is their ability to promote neuroplasticity, potentially increasing dendritic spine density and synaptic strength. Electrophysiological recording, combined with electrical stimulation, can be used to evaluate drug effects on synaptic strength and long-term potentiation (LTP). Previous studies in cell culture suggest that psychedelics enhance dendritic spine density, however, their specific effects on LTP remain unexplored.

Aim

This study had three primary objectives: (1) to examine the effects of psilocin and lysergic acid diethylamide (LSD) on electrically evoked field potentials (eFPs) across different cortical regions; (2) to assess how these psychedelics influence induction and maintenance of LTP; and (3) to explore potential sex differences in these effects.

Methods

Adult C57BL/6 mice (male and female) were euthanised, and 350 µM cortical slices from the medial prefrontal cortex (mPFC), somatosensory and visual cortex were prepared. Slices were maintained in artificial cerebrospinal fluid (aCSF) perfused with carbogen. Electrically evoked field potentials were recorded using stimulating and recording electrodes positioned in cortical Layer V. The monosynaptic component of the field potential (msFP) was identified and recorded for the duration of the experiment, beginning with a 15-minute baseline (aCSF perfusion), followed by 40 minutes of drug exposure, and subsequent HFS to induce LTP. In some cases, the AMPA receptor antagonist 6,7-Dinitroquinoxaline-2,3-dione (DNQX) was applied. Custom MATLAB scripts were used to analyse changes in msFP, and statistical comparisons were performed using SPSS, with one-way ANOVA, two-way ANOVA and post-hoc t-tests as needed.

Results

In all three cortical regions, electrical stimulation evoked a characteristic field potential comprising a short latency monosynaptic component (msFP) and later polysynaptic components. DNQX significantly reduced the msFP in all regions ($P<0.0001$), confirming the involvement of AMPA receptors. Psilocin (1 mM) had no significant effect on the msFP in the mPFC or visual cortex but significantly reduced msFP in the somatosensory cortex ($p=0.031$). Psilocin (10 µM) caused a non-significant increase in the msFP in the mPFC. LSD (1mM) similarly showed a trend toward increased msFP. In the somatosensory and visual cortex, HFS failed to induce LTP. Contrastingly, in the mPFC, HFS significantly enhanced the msFP ($P<0.001$) and this effect was attenuated by psilocin (10 µM). In this region, a lower dose of psilocin (1 µM) and LSD (1 µM) had no effect on LTP. No significant sex differences were observed.

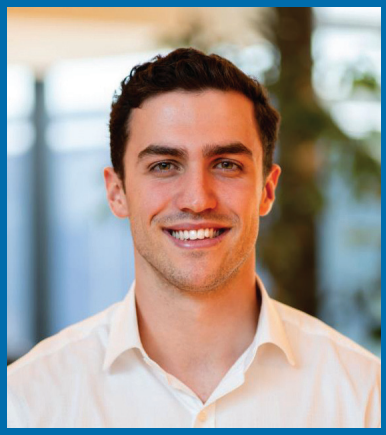
Conclusion

This study contributes to the emerging understanding of psychedelics as potential antidepressants by using electrophysiology to explore their impact on synaptic strength and LTP. Serotonergic psychedelics have no acute effect on synaptic strength in the cortex in vitro, and contrary to expectations psilocin decreased synaptic plasticity in the mPFC. Moving forward, utilising an in vitro protocol or perfusing drug from a longer time period should be considered.

Jackson Catalano

Hyperoxia and in-hospital mortality following an aneurysmal subarachnoid haemorrhage

Supervisor Names and Institute Affiliations:
Supervisor: Professor Biswadev Mitra
Co-supervisor: Doctor Dashiell Gantner
The Emergency Research Unit, The Alfred Hospital
The Alfred Hospital Intensive Care Unit
School of Public Health and Preventive Medicine, Monash University



My name is Jackson Catalano, I am going into my fifth year of medicine in 2025. I decided to undertake an Honours year in 2024 because I enjoy research and would like to be involved in it throughout my career. I have a keen interest in critical care medicine so I thought I would find a project in the Intensive Care Unit. I found the year very interesting and learnt a lot about how to conduct research and about Emergency and Intensive Care medicine – overall, it has been a great year and I am very grateful for the opportunities that I have been presented with. I would definitely recommend for students to do an Honours project, you won't regret it.

ABSTRACT

Background

Non-traumatic subarachnoid haemorrhage (SAH) is a severe cerebrovascular incident that carries high rates of mortality and morbidity, and these patients are often managed in the Intensive Care Unit (ICU). It is common practice to administer oxygen to neurocritical patients in the ICU, however, excessive oxygen therapy has recently been associated with harm. Existing literature has found potential associations between hyperoxia and unfavourable outcomes after cardiac arrest, sepsis, and traumatic brain injury but there is a lack of evidence surrounding SAH. We performed a systematic review and meta-analysis to assess the association between hyperoxia and unfavourable outcomes following a non-traumatic SAH. We found significant associations for hyperoxia exposure and increased risk of unfavourable patient outcomes however, no significant association was found for the outcome of mortality. These results added more variability to the existing body of literature, prompting us to conduct a retrospective cohort analysis to further explore this association.

Research Question

In adult patients mechanically ventilated after an aneurysmal SAH, does hyperoxia exposure increase the risk of in-hospital mortality when compared to normoxia?

Method

A retrospective single-centre cohort study was conducted. Data were extracted on adult patients with confirmed aneurysmal SAH admitted to The Alfred Hospital ICU between 2019 and 2024, who were mechanically ventilated. Hyperoxia was defined as a partial pressure of oxygen ≥200 mmHg on arterial blood gas analysis within 24 hours of ICU admission. The primary outcome was in-hospital mortality. Secondary outcomes were ventilated hours, ICU length of stay (LOS), and hospital LOS. Logistic regression was used to explore the association of hyperoxia with in-hospital mortality.

Results

There were 139 patients included, with 99 exposed to hyperoxia. Baseline characteristics between exposure groups were similar. There was no significant association between hyperoxia and in hospital mortality (odds ratio (OR) 0.75; 95% confidence interval (CI) 0.35-1.60). Additionally, no association between hyperoxia and median ventilated hours (hyperoxia: 98 hours (43-337), no hyperoxia: 58 hours (25-184), p=0.31), median ICU LOS (hyperoxia: 196.8 hours (100.8-331.4), no hyperoxia: 105.8 hours (67.0-259.4), p=0.13), and mean hospital LOS (hyperoxia: 24.2 days (19.1), no hyperoxia: 18.6 days (11.6), p=0.06) was observed.

Conclusions

Exposure to hyperoxia within the first 24 hours of ICU admission after an aneurysmal SAH was not associated with in-hospital mortality, ventilated hours, ICU LOS, or hospital LOS. Any potential harm from hyperoxia requires exploration in larger cohort studies or trials.

Jacqueline Tse

Global Variations in Epilepsy: Baseline Clinical Characteristics and Antiseizure Medication Prescribing Practices

Supervisor Names and Institute Affiliations:
Dr Zhibin Chen, PhD, MBiostat, Bsc(Hons) Research Fellow
School of Translational Medicine, Monash University
Professor Patrick Kwan, MB, BChir, PhD, FRCP, FRACP, FAHMS
Professor of Neurology, Monash University Co-director, Monash Institute of Medical Engineering

In 2024, I had the privilege of working with 'big data' from epilepsy centres worldwide to study global patterns of epilepsy, under the supervision of Dr. Ben Chen and Prof. Patrick Kwan. After completing year 4C, I decided to undertake a BMedSc(Hons) at the School of Translational Medicine, driven by a desire to challenge myself in a new way and gain experience in research. My interest in neurology, which initially motivated me, has deepened throughout the year, as I've gained insight into the nuances of the intersection between clinical practice and research.

Although the learning curve was steep, I've progressed from having no prior research experience to a solid understanding of literature reviews, research project planning, data extraction, statistics, academic writing, and presenting. It has been a rewarding experience.

Beyond my own project, there were also numerous other opportunities, including STM's weekly neuroscience seminars, journal clubs, first seizure clinics, grand rounds, and befriending honours students from various faculties.

I highly recommend pursuing an honours year to anyone with an established interested in any area of medicine, especially if you're looking for a break from hospital placements. Feel free to email me at jtse0003@student.monash.edu if you have any questions.

ABSTRACT

Background

Epilepsy is a common, serious neurological disease, with significant global variability in aetiology, diagnosis and treatment practices across different regions and economic contexts. Despite numerous country-specific studies, there is a lack of global comparative data collected using a standard protocol. There is also a particular dearth of epidemiological research on epilepsy in Australia. A global perspective on baseline clinical characteristics and treatment choices for epilepsy is crucial for understanding and improving patient outcomes worldwide.

Aims

This study aimed to describe the differences in baseline clinical characteristics among newly diagnosed epilepsy patients and antiseizure medication (ASM) prescribing practices globally, with Australia as a focus comparator. It also sought to investigate how economic context influences these differences.

Methods

This observational, retrospective, cross-cohort comparison study used a multi-national, multicentre collaboration of specialist epilepsy centres, comprising 13 data registries across 10 countries. The analysis included newly diagnosed epilepsy patients aged 12 years or older who were treated with ASMs and followed up for at least one year in clinics between February 1972 and January 2023. Data on baseline clinical characteristics, initial ASM regimens, and drug load was collected. Statistical differences between middle-income countries (MIC), high-income countries (HIC) and Australia were analysed for each factor using chi-square tests for categorical data, Mann-Whitney U tests for continuous data and logistic regression.

Results

Among the 6668 patients included, 3079 (46.2%) were female, with a median age of 29 years (range, 12-91 years). There were 4586 patients classified to have focal epilepsy and 2011 with generalised or unclassified epilepsy. Compared to HICs, patients in MICs were younger, had a higher proportion of generalised or unclassified epilepsy (1296, 64%) and had increased odds of having more than 5 pre-treatment seizures in focal epilepsy (OR=1.42, 95%CI 1.23-1.63, p<.001). Patients in MICs also showed increased odds of risk factors including birth trauma, central nervous system infection, head injury and febrile seizures, and decreased odds of drug abuse, alcohol abuse, cerebrovascular disease, intellectual disability and psychiatric comorbidities. Australia was comparable to HICs in most aspects, except Australian patients had lower odds of more than 5 pre-treatment seizures (OR=0.42, 95%CI 0.32-0.53, p<.001), and had increased rates of birth trauma, CNS infection, head injury and drug abuse. Newer generation ASMs were first prescribed in HICs, followed by MICs then Australia, with HICs continuing to prescribe them most frequently. From 2008 to 2023, valproate was most prescribed in MICs and levetiracetam in HICs. Daily drug loads were higher in HICs compared to MICs and Australia.

Conclusion

This global comparative study showed significant variations in epilepsy clinical characteristics and drug-prescribing behaviours between MICs and HICs. Using Australia as a comparator illustrated that economic factors alone do not explain these differences. The findings provide valuable quantitative data on demographics and risk factors across economic contexts, which can inform public health policymakers in developing tailored international preventative strategies for epilepsy. Furthermore, the study revealed current ASM prescribing trends, providing context to treatment outcomes for patients from different world regions and enhancing the global understanding of epilepsy overall.

Jennifer Langford

Empowering Choice and Unlocking Potential: Ethical Information Disclosure Requirements in the Donation of Surplus Frozen Eggs to Research

Supervisor Names and Institute Affiliations:
Doctor Joanna Demaree-Cotton (University of Oxford)
Doctor Molly Johnston (Monash Bioethics Centre, Monash University)

Hi! I'm Jen and I completed my BMedSc(Hons) year at Oxford University, studying under the combined Oxford-Monash Bioethics Program.

I chose to pursue a BMedSc(hons) after 4C, in the area of reproductive bioethics, given my existing interest in Obstetrics and Gynaecology, and the ethical conundrums which exist in this field. Furthermore, I hoped that a year away from clinical medicine would allow me to pursue different interests and learn more about the world of research, which it certainly has!

I am so grateful for the opportunity to complete my honours year at the University of Oxford. It has been such an eye-opening and rewarding year. I feel so lucky to have been able to try new things like join different clubs and societies, experience Oxford balls and formal events and meet so many incredible people all in the space of a year.

Whilst this year was certainly challenging at times, I have acquired so many key skills and learnt so much about bioethics, life as a researcher and academic writing, which has been very fulfilling.

Please feel free to contact me: jenniferlangford1213@gmail.com, if you would like to chat about the honours experience at Oxford.

ABSTRACT

Background

An increased number of Surplus Frozen Eggs (SFEs) are no longer wanted by the individuals who froze them. Despite a preference among individuals with SFEs to donate them to research, donation rates remain low. One cause may be the requirement that detailed information be disclosed about the specific research projects being donated to. Therefore, if no suitable research project is recruiting donor eggs when an individual wants to relinquish their SFEs, their preference to donate cannot be fulfilled. An ethical tension therefore exists between the high information disclosure requirements of the currently imposed specific consent model, and supporting an individual's preference to donate their SFEs to research. The suitability of a specific consent model in biomaterial donation to research has been questioned, particularly in comparison to the broad consent model, which imposes lower information requirements, and thus allows for donation to future, undefined projects. However, the ethical permissibility of these consent models has not been considered within the context of SFE donation.

Method

The aim of this project was to determine what level of information is ethically adequate for informed consent procedures in the context of SFE donation to research. An online survey of 225 United Kingdom (UK) based participants was conducted. The first section tested the impact of information disclosure and preference fulfilment on participants' views towards whether an individual (1) provided informed consent, (2) made an autonomous decision, and (3) was treated morally. These three categories were used to assess the overall ethical sufficiency of different consent models. The second section of the survey evaluated views towards consent personalisation and the necessity of disclosing different information categories.

Results

Participants viewed both specific and broad information disclosure as ethically sufficient for the donation of SFEs to research. Participants also highly valued preference fulfilment, only agreeing that a potential donor was able to make an autonomous decision, and be treated morally, when their preference to donate their SFEs to research was fulfilled. This indicates that preference fulfillment may be more highly valued than information disclosure in this context. Finally, participants supported an informed consent approach which allowed for aspects of consent personalisation, such as the involvement of subjects in determining the amount and type of information they require.

Conclusions

My findings suggest that a broad consent model is ethically sufficient for SFE donation to research, with regards to its information disclosure requirements. First, because broad information disclosure was viewed as ethically sufficient in this context, and secondly because broad consent overcomes obstacles to the donation of eggs to research, thus facilitating the preference fulfilment of individuals with SFEs. Therefore, I argue that sacrificing the specific information disclosure of specific consent, to fulfil an individual's preference to donate their SFE to research, as in broad consent, is ethically justified. Finally, I propose that consent personalisation considerations could be implemented alongside a broad consent model, to address individual consent needs. Ultimately, my findings encourage further discussion and research to improve consent processes in SFE donation, to ensure they support women's autonomy.

Katherine (Katya) Gvozdenko

Must doctors be good people? What should be the threshold for sanctioning doctors

Supervisor Names and Institute Affiliations:
Professor Dominic Wilkinson, University of Oxford
Associate Professor Adrian Carter, Monash Bioethics Centre, Monash University

Wow, what an incredible year! I am very grateful for the opportunity to study at the University of Oxford with the Monash Bioethics Program. I have always enjoyed clinical-adjacent ventures, such as med-tech, healthcare consulting and public policy (Note: if you are interested in any of the above, please feel free to contact). Studying bioethics this year was a wonderful chance to combine clinical knowledge / context with a more philosophical perspective (and involved lots of new learning about ethics and philosophy!)

This year has gone above and beyond what I hoped for: development of research skills, and establishing a new life abroad and being able to step away from placement to gain perspective on what I would like in my career as a doctor.

I truly cannot recommend this year and the Oxford program highly enough. My supervisors Dominic Wilkinson and Adrian Carter were incredible: they read many drafts, provided great feedback and I hope to continue collaborating with them throughout next year. I am more than happy to be contacted by future students on: katya.gvozdenko@gmail.com about question on the program, my supervisors or opportunities available to med students!

ABSTRACT

Recent high-profile cases of medical misconduct (for example, a GP suspended for her role in climate protests) have sparked debate about the severity of sanctions imposed by the General Medical Council (GMC). The discussion has highlighted controversy around sanctions for doctors' misbehaviour in their private lives, minor unlawful behaviour and lawful but unethical misconduct. The revised 'Good Medical Practice' guide (2024), which mandates doctors to be "kind", has further intensified concerns about the current threshold for sanctioning medical professionals.

This project, combining ethical analysis with empirical research, investigated the appropriate threshold for sanctioning doctors, addressing both general misconduct and the novel kindness clause.

The ethical component explored justifications for sanctions with particular focus on the GMC's prima facie reason for sanctions: protecting the medical profession's reputation. This section also included possible justifications for the new kindness clause and explored alternatives such as mandating 'not being unkind'. The ethical analysis weighed concern for patient safety, maintaining public trust and contractualism – all in favour of more harsh sanctions – with arguments in favour of more lenient sanctions including concern over double punishment and a doctors' right to private life.

The empirical component employed a three-pronged online experimental survey, administered to a nationally representative sample of 320 UK participants. Section A contained real-life inspired vignettes of doctor misconduct, with participants randomized to different sanction groups. Section B examined unethical conduct, with participants randomised to location and frequency of misbehaviour. Both sections assessed participants' trust in the individual doctor and the profession. Section C incorporated a mixed-methods approach, utilizing both qualitative and quantitative questions to explore participants' perceptions of 'kindness'.

Section A results suggested that whilst respondents favoured lenient punishments for non-clinical misbehaviour (83% - 92%) compared to clinical misconduct (16%), increasing sanction severity did not have a meaningful effect on the public's trust in the profession. For Section B, whilst the results were not statistically significant, it appeared that participants had less mistrust in doctors committing offences in their private life compared to work incidents (especially if repeated). Section C results showed the subjectivity of kindness with some common behaviours judged by 47.5% of respondents as 'unkind' and 32% as 'kind'.

The empirical findings were integrated with ethical considerations through a process of Collective Reflective Equilibrium in Practice to produce a potential sanction model, considering the behaviour's clinical impact, impact on the profession's reputation, and concurrent disciplinary actions. I argue, on the basis of my analysis, that the kindness clause should be reframed as an aspirational rather than mandatory element of Good Medical Practice. This approach aims to strike the balance between advocating for compassionate care and acknowledging the complexities of enforcing subjective qualities.

This project significantly advances the discourse on professional conduct by providing appropriate sanction thresholds, enhancing understanding of how sanctions affect reputation, and offering novel research on kindness in medicine. By combining ethical analysis with empirical data, this study provides recommendations for refining healthcare guidelines, ultimately striving to improve patient care and maintain public trust in the system.

Kennice Tan

Uncovering the unmet needs of people with stroke in the community: a systematic review and meta-analysis

Supervisor Names and Institute Affiliations:
Dr Muideen Olaiya, Dr Tara Purvis, Dr Tharshanah Thayabaranathan
Stroke and Ageing Research Group, School of Clinical Sciences, Monash University, Clayton

After finishing Year 4C in 2023, I decided that an Honours year would be a great way to build my research skills and gain a fresh perspective on healthcare and medicine. Dedicating a year to this project came with its challenges, but I learned so much about the process behind creating impactful research. I was also lucky to work with people who are truly passionate about stroke and discovered a variety of exciting research areas!

I'm very happy to be contacted at ktan0096@student.monash.edu if you have any questions.

ABSTRACT

Background

Stroke poses a significant public health challenge, being a leading cause of death and disability in Australia and globally. People with stroke report considerable unmet needs in the community which affect their recovery and quality of life. It is important to identify contemporary unmet needs and associated factors to inform interventions that improve long-term care post-stroke. Previous systematic reviews of unmet needs after stroke included data generated from tools that focused on needs rather than unmet needs, e.g., the Post Stroke Checklist (PSC), thus potentially overestimating their prevalence. Moreover, there is a lack of synthesised data on the prevalence of unmet needs post-stroke derived from meta-analysis.

Objectives

To synthesise contemporary evidence (i.e., data collected between 2013 and 2024) on the prevalence of unmet needs among people living with stroke in the community, and identify factors associated with reporting unmet needs.

Methods

A comprehensive search of three major databases (Medline, EMBASE, and CINAHL) was undertaken for articles published from January 1, 2013, to June 6, 2024. Articles were scrutinised to differentiate between those designed to measure 'unmet needs' vs. 'needs.' Studies were included if they contained quantitative data on the prevalence of unmet needs of people with stroke, as reported by them or their primary support person(s). Two reviewers independently screened the retrieved articles for inclusion prior to data extraction. Unmet needs were consolidated and categorised into domains. Pooled prevalence estimates of unmet needs were calculated using meta-analysis when more than one data point was available. Factors associated with unmet needs were quantitatively summarised and narratively synthesised.

Results

After screening 1,073 articles, 20 studies were eligible for inclusion; 13 for the main analysis and 7 for a sub-analysis on the prevalence of needs, collected using the PSC. Only one study was conducted in a low-to-middle income country. The pooled proportion of people with stroke who reported at least one unmet need was 77% (95% CI 59-91), with substantial heterogeneity (I^2 = 98%). Overall, 59 unmet needs were identified and categorised into the following domains: body function, cognition/mental health, social and community integration, activity and participation, service/information, and recovery. The unmet needs with the highest pooled prevalence estimates in each domain, in corresponding order, were fatigue (46%), concentration (42%), family relationship (16%), transportation (38%), stroke education (72%), and diet (61%). Generally, the pooled prevalence estimates of needs (assessed using the PSC) were higher than the unmet needs, with the largest disparities found for spasticity (+17%), mobility (+14%), and cognition (+13%). Factors associated with unmet needs were investigated in eight studies. Being financially disadvantaged was most consistently reported to be associated with more unmet needs after stroke.

Conclusions

Unmet needs are prevalent among people living with stroke in the community, with education on stroke being a leading unmet need. Factors associated with unmet needs after stroke are complex and require further research in detail. Findings from this study can be used in prioritising tailored interventions to improve long-term care and outcomes for people living with stroke in the community.

Khy Yie Choo

The Roles of Follistatin and Follistatin-like Proteins in Heart Failure with Preserved Ejection Fraction

Supervisor Names and Institute Affiliations:
Professor David Kaye, Associate Professor Bing Wang, Dr Ruth Magaye
Baker Heart and Diabetes Institute
School of Translational Medicine, Monash University

I undertook my honours year between 4th and 5th year of Medicine. As I was interested in Cardiology, I decided to pursue a research project related to the field. Undertaking a laboratory-based project was a challenging yet incredibly rewarding experience. Throughout this year, I have gained valuable research and communication skills that are transferrable for the future, as well as numerous laboratory techniques. Despite all the trials and tribulations, this year has given me a greater appreciation of pre-clinical and translational research. I would like to thank all my supervisors and the team at the Heart Failure Research Group who have supported me tremendously this year.

ABSTRACT

Background

Heart failure with preserved ejection fraction (HFpEF) is a complex clinical syndrome characterised by impaired diastolic function and cardiac stiffness. The development of novel HFpEF therapies is hindered by the lack of therapeutic targets. Follistatin-like proteins are cardiokines thought to exert compensatory cardioprotective properties.

Method

Serum concentrations of follistatin, FSTL1 and FSTL3 in the coronary sinus, pulmonary artery and peripheral arteries were determined via enzyme-linked immunosorbent assay (ELISA). Follistatin, FSTL1 and FSTL3 myocardial expression were measured in cardiac tissue obtained from aged (77-79 weeks) and young (10-12 weeks) Female C57BL/6J mice subjected to 12 weeks of high-fat diet and AngII infusion (0.75mg/kg/day) via osmotic minipumps for the last 6 weeks. Gene expression changes were measured via real-time quantitative polymerase chain reaction (RT-qPCR) in neonatal rat ventricular cardiomyocytes (NRVMs) and cardiac fibroblasts (NRCFs) subjected to AngII, IL-1ß, TNFα or TGFß stimuli.

Results

Seven healthy subjects and twelve HFpEF patients were included. HFpEF patients were mostly female with higher BMI ($p<0.05$). Serum FSTL3 was significantly elevated in the coronary ($p=0.03$) and systemic ($p<0.05$) circulation of HFpEF patients, but no differential transcardiac gradients of follistatin, FSTL1 and FSTL3 were observed. Myocardial FSTL1 expression was upregulated 1.75-fold ($p<0.001$) and 1.89-fold ($p<0.001$) in young and aged HFpEF mice respectively. Cardiac FSTL3 expression was also increased in young and aged HFpEF mice compared to their respective controls ($p<0.05$). In vitro, NRCFs demonstrated a 7.86-fold ($p<0.0001$), 24.05-fold ($p<0.0001$) and 2.97-fold ($p<0.0001$) higher basal expression of follistatin, FSTL1 and FSTL3 respectively compared to NRVMs. IL-1ß and TGFß stimuli substantially elevated follistatin ($p<0.0001$) and FSTL3 ($p<0.0001$) expression in NRCFs, suggesting they are potential regulators of follistatin signalling.

Conclusion

Systemic and coronary FSTL3 levels were increased in HFpEF patients, and myocardial expression of follistatin-like proteins was upregulated in HFpEF mice, suggesting their involvement in the pathogenesis of HFpEF. Further studies are needed to elucidate the mechanistic properties of their cardioprotective effects.

Lakshitha Sivayogan

Sex Differences in Diabetes Healthcare: The Australian Experience

Supervisor Names and Institute Affiliations:
Professor Sophia Zoungas and Dr Ella Zomer,
School of Public Health and Preventive Medicine, Monash University

I chose my Honours project because I am interested in Endocrinology and specifically diabetes care but also the influence of sex on the various facets of healthcare. It was a unique opportunity to be able to work with a large dataset which allowed me to investigate these sex differences more comprehensively and it was an enriching experience to do so alongside an experienced research and clinical registry team. I have gained a lot from my Honours year in regards to hands-on experience leading a research project and working collaboratively with other researchers.

I am happy to be contacted via Facebook.

ABSTRACT

Background

Diabetes is a chronic condition that poses a significant burden on the healthcare system. The identification of areas that require optimisation is essential to begin alleviating this pressure. Sex differences have been observed in various aspects of diabetes care and associated healthcare processes; however, only a limited number of studies have explored this in the Australian context. Utilising a contemporary dataset specific to the Australian context would assist in targeting change to improve the management of diabetes for all Australians.

Objectives

1. Identify areas of sex disparity in risk factors, comorbidities and complications in patients with type 1 diabetes mellitus (T1DM) and type 2 diabetes mellitus (T2DM) in the Australian context.
2. Identify areas of sex disparity in the management of patients with T1DM and T2DM in the Australian context.
3. Explore the relationships between any differences in outcomes with any differences in management.

Methods

Using cross-sectional data from the Australian National Diabetes Audit (ANDA), a long-standing audit and feedback activity, a retrospective analysis was performed exploring sex differences in the care and outcomes of adult patients (aged ≥18 years) with T1DM or T2DM captured in 2021 and 2022. A deep dive analysis of pre-specified clinical and patient-reported variables was undertaken by diabetes type using SPSS. Categorical variables were analysed using Pearson Chi-Square Test and Yates' Correction for Continuity where appropriate. Continuous variables were analysed using the Independent Samples T-Test and Mann-Whitney U test where appropriate.

Results

There were 8620 patients who met the inclusion criteria captured in ANDA 2021 and 2022; 2694 patients with T1DM and 5926 patients with T2DM. Sex differences were identified across a number of important diabetes health indicators. In both T1DM AND T2DM cohorts, females had significantly higher mean body mass index, total cholesterol, low-density lipoprotein cholesterol and high-density lipoprotein cholesterol while males had higher triglycerides and blood pressure. Moreover, males were significantly more likely to be taking anti-hypertensive and lipid lowering medications (p=<0.001 and p=0.002, respectively) than females. Males with T2DM were more likely to experience the composites of cardiorenal and foot complications (p=<0.001 for all), as well as acute glycaemic emergencies than females. While no significant difference was found in the prevalence of composite complications in patients with T1DM, there were significant sex differences in some of the individual conditions/components of the composites (such as stroke, peripheral vascular disease and foot ulceration).

Conclusion

Sex plays a key role in the risk factors, complications, comorbidities and care received by patients diagnosed with T1DM or T2DM. While future research is needed to understand the key drivers of these differences (e.g., biological, clinician and/or patient preferences, or sociocultural factors) and the causal relationships between differences in diabetes management and outcomes, this study highlights that sex needs to be integrated into clinical decision-making. Clinicians should consider the sex disparities recognised in this study such as increased risks of specific complications in males or females and sex-correlated treatment gaps to ensure targeted clinical management and better outcomes for all patients.

Lily Davies

What is the impact of location on those with high grade gliomas?

Supervisor Names and Institute Affiliations:
Professor Justin Moore (Chair of Neurosurgery Department, Monash Health)
(Department of Surgery, School of Clinical Sciences, Monash University)
Dr Adrian Praeger (Neurosurgery Department, Monash Health)
(Department of Surgery, School of Clinical Sciences, Monash University)

After finishing fourth year, I choose to do an Honours year to challenge myself to learn new skills and learn more about clinical research. I choose my project because I am passionate about understanding factors which influence accessible health care to vulnerable patient groups. The best thing I have learnt from this year is how to independently problem solve, but I loved discovering the team elements involved in research. I really enjoyed my year and would be happy to speak to any students considering undertaking an honours year!

ABSTRACT

Introduction

High grade gliomas (HGG) are fatal malignancies of the central nervous system, and prognosis is poor even with access to specialised care. In Australia, neuro-oncological surgical centres are concentrated to metropolitan locations which increases facility case load, shown to improve survival. However, rural Australians have poor health access and outcomes, and this may be compounded through a centralisation care platform for those with HGG. This study aims to investigate the relationship of geography on timely care, access to gold standard therapy and survival for HGG patients receiving neurosurgical care at our institution.

Methods

We retrospectively reviewed patients undergoing neuro-oncological surgery at our institution from January 2017 to June 2023. All data was collected from medical records, and the cohort was split based on disease grade. Geography was defined through location of residence and distance travelled to the surgical centre. Outcomes of interest were compared across geographical cohorts and related to time to care, treatment received and length of survival.

Results

314 patients met inclusion criteria, 84% of which presented with grade 4 disease. 29.6% (n = 93) of the cohort resided rurally and the median travel distance was 27.8 km (range: 0.8-568 km). Age, comorbidity score, disease grade and sex were not statistically different across geographical measures, but socioeconomic status was ($p < 0.001$). Median time to surgery was 5 days, and 7.6% of the population waited more than 28 days from imaging to receive surgery.

No statistically significant differences in time to surgery, chemotherapy and radiation, and the odds of experiencing adjuvant therapy and standard dose radiation were observed based on geography. Multivariate logistic regression revealed that those travelling further with grade 3 disease were more likely to experience a delay in surgery (adjusted OR: 17.5, CI: 1.81-457, p 0.031). Those travelling in travel group 3 and 4 with grade 4 disease were more likely to have complete surgical excision (adjusted OR: 4.82, CI: 2.12-11.4, p <0.001. OR: 2.86, CI: 1.31-6.52, p 0.010, respectively).

Kaplan Meier curves failed to demonstrate survival differences across rural ($p = 0.53$) or travel cohorts ($p = 0.86$), however, rurality as an ordinal variable based on the Modified Monash Model demonstrated survival differences on the log rank test ($p = 0.028$). Rural patients had comparable survival to the urban population (adjusted HR: 1.05, CI: 0.73-1.50, $p = 0.80$), as did those travelling more than 70 km when compared to those travelling less than 13 km (adjusted HR: 0.91, CI 0.58-1.41, $p = 0.70$).

Conclusion

This is the first Australian study to comprehensively assess the impact of geography on a HGG cohort. High volume neuro-oncology services treat a geographically diverse range of patients, but our study contends that the centralisation of care does not compromise on service provision or outcomes. Whilst areas of improvement were identified, particularly in those with grade 3 disease from geographically isolated communities, differences were generally insignificant. Further studies are needed to identify the influence geography may play on one's experience in the health system.

Mathew Roy

The Underlying Role of Muscarinic Receptors in the Complex Cognitive Process of Evidence Accumulation and on Decision-Making

Supervisor Names and Institute Affiliations:
Professor Mark Bellgrove - Turner Institute, School of Psychological Sciences, Monash University, Australia
Professor Alexander Thiele - Biosciences Institute, Centre for Transformative Neuroscience, Newcastle University, United Kingdom

My name is Mathew Roy and this year I completed my Bachelor of Medical Science (Honours), where I was incredibly fortunate to be a part of the Colin Ingram Travel Award. This program is a joint collaboration between Monash University from Australia and Newcastle University from United Kingdom in honour of the late Professor Colin Ingram, a neurobiologist. My project was based in neuroendocrinology to further understand the neural networks within the brain and how they communicate in cognitive function execution within humans. I completed my data collection and lab work in the UK and returned to Australia to complete the writing of my paper and thesis. I learned a lot from the collaboration between medical institutes to international collaboration through this award and would highly recommend it to anyone with an interest in undertaking an honours year within neurology and/or endocrinology.
I was one of two students who were awarded this opportunity with the other project being of a similar topic.

ABSTRACT

Background

The cholinergic system, with acetylcholine (ACh) as its primary neurotransmitter, is crucial for regulating cognitive processes such as attention, learning, and decision-making. ACh acts across various brain regions, where it enhances attentional focus and information processing accuracy by modulating cortical activity. Disruptions in this system, whether through lesions or pharmacological interventions, can impair attention and disrupt cognitive control. Antimuscarinic drugs, which inhibit cholinergic activity, provide insights into the role of ACh in cognitive functions. Understanding the dual effects of cholinergic modulation in fluctuating environments can reveal how the system influences cognitive resilience and adaptability, with implications for neuropsychiatric treatments. This study investigates how antimuscarinic-induced changes in ACh signaling affect evidence accumulation and decision-making accuracy, with a focus on volatile learning environments.

Method

This was a single-blinded crossover study involving forty-five participants (n=45) completing a difficult reaction-based evidence accumulation task under placebo and drug (600mg scopolamine) conditions. The task involved participants viewing a succession of 10 arrows of varying opacity (weights) and directions (left or right), upon seeing the arrows participants would have to decide direction within 2.5 seconds of the first arrow before the lapse of the last arrow for a reward. No-decision or wrong answer resulted in no reward. Metrics such as cumulative evidence gathered, subjective weight assigned to cues, probability of correct answers, number of cues reviewed, and reaction times were recorded. Mixed model ANOVAs were conducted to analyse the effects of drug condition and session order on these variables.

Results

The administration of antimuscarinics was associated with increased learning rates, allowing participants to adapt more quickly. However, it also led to an overestimation of the presented evidence, with participants assigning higher-than-actual values to cues while also taking in a lower level of presented evidence before making decisions. This suggests an impact on both the rate and accuracy of evidence evaluation during decision-making.

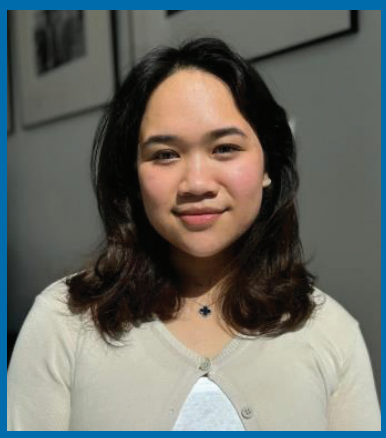
Conclusions

Antimuscarinics enhance adaptability in changing environments by boosting learning rates, though they simultaneously introduce a bias towards overestimating evidence. These findings advance our understanding of how antimuscarinics alter cognitive processing and decision-making, with implications for neuropsychopharmacology and cognitive psychology, particularly concerning drug effects in uncertain settings.

Keisya Nadira Fana

Blood Pressure Management in Intacerebral Haemorrhage Stroke

Supervisor Names and Institute Affiliations:
Prof. Biswadev Mitra and Dr Cristina Roman,
School of Public Health and Preventive Medicine, Monash University



Hi! My name is Nadira and I'm a medical student from Jakarta, Indonesia. I'm here for my degree in BMedSc(Hons) from the University of Indonesia. I chose this project because I have always had a profound interest in emergency medicine. Coming from an Asian background, it's been very interesting to see how the medical field works very differently than back home. An advice I would give to future honours students is that it's always okay to ask questions and to seek for opportunities from your supervisors. I've learnt that asking is always better than assuming the answers, even if you think it's a little bit silly! And of course, don't forget to have fun, don't be too hard on yourself, because the bad stuff will eventually pass.

I would be delighted to answer any questions regarding my Honours year! Please do not hesitate to contact me via nadirafana03@gmail.com

ABSTRACT

Background

A literature review was conducted to investigate the association between hypertension and intracerebral haemorrhagic (ICH) and also review trials that have been conducted to see the effects of blood pressure lowering in ICH. A retrospective cohort study was conducted on a preliminary sample of 150 patients who had presented to The Alfred Emergency Department (ED) from 2018 to 2023, and data were extracted from patient records, including patient characteristics (age), presenting vital signs (length of stay in hospital (LoS), LoS in ED, GCS, body temperature, heart rate, oxygen saturation, and systolic blood pressure) and treatment details (antihypertensive(s) administered (if any), dose of antihypertensive and method of administration of the antihypertensive). The primary outcome was to see the effect of treatment on patient outcomes (mortality and length of stay in hospital). Secondary outcomes included the number of ICH patients who presented with hypertension and the drugs that were administered to the hypertensive ICH patients.

Method

A literature review was conducted to investigate the association between hypertension and intracerebral haemorrhagic (ICH) and also review trials that have been conducted to see the effects of blood pressure lowering in ICH. A retrospective cohort study was conducted on a preliminary sample of 150 patients who had presented to The Alfred Emergency Department (ED) from 2018 to 2023, and data were extracted from patient records, including patient characteristics (age), presenting vital signs (length of stay in hospital (LoS), LoS in ED, GCS, body temperature, heart rate, oxygen saturation, and systolic blood pressure) and treatment details (antihypertensive(s) administered (if any), dose of antihypertensive and method of administration of the antihypertensive). The primary outcome was to see the effect of treatment on patient outcomes (mortality and length of stay in hospital). Secondary outcomes included the number of ICH patients who presented with hypertension and the drugs that were administered to the hypertensive ICH patients.

Results

Of 150 patients, 82 were male and had an average age of 78.2 years old. There were 85 (56.7%) patients hypertensive on initial presentation. We found that older age and lower Glasgow Coma Scale (GCS) scores emerged as significant predictors, with each additional year increasing the risk of mortality in ICH patients and higher GCS scores correlated with a lower likelihood of death. Age (adjusted OR 1.07; 95%CI 1.02 - 1.12) and GCS 13-15 (adjusted OR 0.25; 95%Ci; 0.08-0.81) remained significant predictors of mortality when adjusted for confounding factors. However, initial hypertension (adjusted OR 1.00; 95%CI: 0.99 - 1.00) and time hypertensive (adjusted OR 0.99; 95%CI: 0.99-1.00) were not associated with hospital mortality. We found no association between hypertension and length of stay in hospital. Among 85 (56.7%) hypertensive patients, 67(83.8%) received antihypertensives, compared to 35 (53.8%)non-hypertensive patients.

Conclusions

Mortality from haemorrhagic stroke was associated with older age and a lower GCS score. More than half of patients who arrived with a haemorrhagic stroke also had hypertension. However, we discovered no apparent link between initial blood pressure and death. In contrast, hypertension in haemorrhagic stroke was aggressively controlled but requires further research to confirm any evidence of benefit from this clinical practice.

Nanditha Hareesh

Triple Elimination of Mother-to-child Transmission of HIV, Hepatitis B and Syphilis in Asia-Pacific: A Systematic Review

Supervisor Names and Institute Affiliations:
Dr Minh Pham and Dr Fiona Bruinsma
Burnet Institute
School of Public Health and Preventive Medicine, Monash University

I was always interested in public/global health and developed a liking for paediatrics in 4th year, and the Burnet Global Women and Newborn Health Group seemed like a perfect blend of the two which is why I chose to complete my project there. My review focused on maternal and neonatal health with a focus on prevention and community health in the Asia-Pacific and allowed me to learn about international health promotion, challenges to antenatal care across multiple countries, and implications of policies from WHO/UNICEF etc.

I had a wonderful year experiencing a different area of medical research. Burnet provided opportunities to participate in mentoring programs, journal clubs, student presentations and other seminars throughout the year which was a great way to learn about the work others were doing and other career opportunities. It was also a flexible working environment which was a refreshing change from the hospital. I hope to continue working on the project for my SIP and beyond and have a career integrating clinical practice and public health.

Happy to be contacted at nhar0025@student.monash.edu if people have questions!

ABSTRACT

Background

Human Immunodeficiency Virus (HIV), hepatitis B virus (HBV)and syphilis are sexually transmitted infections (STIs) that can be transmitted from mother to child in the pregnancy, childbirth, and breastfeeding period. World Health Organisation (WHO) has introduced the concept of triple elimination to address all three conditions in an integrated manner. The triple elimination initiative set targets for a range of outcomes to be achieved by 2030. Countries in the WHO regions of Southeast Asia and Western Pacific have committed to meeting these, with three countries already validated. However, progress in the remaining countries remains unclear with several targets having no up to date data.

Aim

The aim of this systematic review is to evaluate the progress made in Fiji, Papua New Guinea, Solomon Islands, Mongolia, Indonesia, Nepal, Bangladesh, and Timor-Leste towards achieving 10 of the impact and process indicators the triple elimination targets set in the WHO Regional Framework for the Triple Elimination of Mother-to-Child Transmission of HIV, Hepatitis B and Syphilis in Asia and the Pacific 2018–2030.

Methods

A review protocol was developed and registered on PROSPERO, as per the Preferred Reporting Items for Systematic Reviews and Meta-analyses (PRISMA) guideline.

The review includes peer-reviewed studies that were undertaken in the eight selected countries, must report on pregnant women and/or children and be published after 2010. Data obtained from grey literature and online repositories were also used to report on outcomes of interest.

Studies were screened on Covidence and extracted using a Microsoft Excel template. Descriptive analysis and narrative synthesis methods were used to analyse the data.

Results

The review found 4421 studies across all databases, out of which 58 were eligible for data extraction following abstract and full text screening. Data from two online databases, one WHO report, and two review articles were also included.

182 data points were extracted from the studies and databases across the ten outcomes. No country is on track to achieve the 2030 triple elimination targets. Three countries achieved the target percentage of syphilis testing (Bangladesh, Fiji, and Solomon Islands) and syphilis treatment (Fiji, Mongolia, and Timor-Leste) coverage.

Data availability was uneven across the outcomes, with only one country (Mongolia) having national estimates for hepatitis B surface antigen coverage. Published studies varied in sample size (25 to 109,262) and were primarily single centre studies with a cross sectional design.

Conclusion

This review highlights that data availability for triple elimination is inconsistent and available data suggests that countries are not on course to achieve the 2030 targets. WHO requires countries to achieve the target value and maintain it for one to two years, which none of the included countries met. Upstream challenges such as lack of resources and staff, barriers in accessing antenatal care and stigma surrounding STIs affect service coverage and data collection, subsequently hindering progress towards triple elimination.

This review joins only one other (undertaken in the Western Pacific Region) in evaluating progress towards triple elimination. As the goals are nearing date of expected completion in 2030, it highlights both the need for accelerated action and further studies in this area.

Nethum Devendra

Fabrication of a Compliance Aortic Phantom

Supervisor Names and Institute Affiliations:
A/Prof. Robert Gooley
Dr Michael Seman
Dr Andrew Stephens
Victorian Heart Institute, Victorian Heart Hospital

Having completed my fourth year, I took the opportunity to undertake a BMedSc(Hons) to explore my interest in engineering and how it can be harnessed to improve clinical care. This led me to the VHI's Cardio-Respiratory Engineering and Technology laboratory (CREATElab) for my honours year. I was also fortunate to take part in Programming/Medical AI and 3D printing workshops run by A/Prof. Khoa Cao's Monash Medical Technology Lab (MMTL). Through these, I was able to immerse myself in the world of biomedical engineering research and MedTech. While there was undoubtedly a steep learning curve, I'm grateful for the wide range of research and technical skills as well as design and manufacturing experience I accumulated throughout this year. My BMedSc(Hons) year undoubtedly reinforced by interests in biomedical engineering, and I am excited to see where this takes me next!

Please don't hesitate to reach out to me at ndev0006@student.monash.edu if you have any questions.

ABSTRACT

Background

Structural and physiological changes to the aorta are often associated with cardiovascular diseases (CVDs) including aortic dissection and aortic aneurysm. Aortic phantoms provide a valuable method for modelling the aorta in vitro, particularly for haemodynamic simulations and medical device evaluation. Aortic compliance plays a crucial role in aortic haemodynamics and should therefore be faithfully replicated to accurately simulate native aortic haemodynamics. Currently, only silicone moulding can simultaneously achieve physiological compliance and transparency necessary for some haemodynamic experiments.
The lost-core technique of silicone moulding shows the most promise with regards to manufacturing a precise wall thickness. While fused deposition modelling (FDM) and material jetting technology have both been explored for mould construction, resin printing is yet to be investigated.

Method

Tensile testing was conducted on the candidate silicone, Sylgard 184, to characterise its elasticity and determine what wall thickness would provide a physiological level of compliance. The compliance this wall thickness could achieve was then validated using a moulded straight tube. Distensibility was used as a surrogate measure of compliance in this study. An idealised aortic geometry was designed using averaged patient dimensions. From this, the thoracic portion was used to design and then manufacture an aortic phantom. This utilised the lost-core casting technique with resin printed outer moulds and an FDM printed dissolvable inner core. The phantom's distensibility was experimentally validated.

Results

Tensile testing of Sylgard 184 yielded an elastic modulus of 1.24 MPa, which led to a 2 mm wall thickness being chosen. The straight tube mould confirmed that a 2 mm wall thickness would produce a distensibility of 1.9 × 10-3 mmHg-1 which was within the target range of 1.92 ± 1.3 × 10−3 mmHg−1. Similarly, the aortic phantom also demonstrated a physiological distensibility of 1.9 × 10-3 mmHg-1. While the resin printed moulds initially caused silicone cure inhibition, after thorough investigation, the optimal preparation of resin printed moulds was determined to prevent this cure inhibition.

Conclusions

An anatomical aortic phantom was successfully fabricated using the lost core technique and was able to faithfully replicate a physiological level of compliance. This phantom may therefore find significant utility in cardiovascular research, particularly in the fields of in-vitro haemodynamic simulations and medical device evaluation, ultimately advancing our understanding of the aorta's complex role in cardiovascular diseases.

Ramin Odisho

Advancing Novel Treatments to Improve Outcomes from Cardiac Arrest & Resuscitation

Supervisor Names and Institute Affiliations:
Supervisor: Dr Daniel Donner
Co-supervisor: A/Prof Bing Wang
Baker Heart & Diabetes Institute, School of Translational Medicine - Monash University

I undertook a BMedSc (Hons) after my 4th year of Medicine. I am particularly interested in the intersection between pre-clinical research and clinical practice, especially in the field of cardiology.

I was interested in the scope of my project, which involved understanding haemodynamic changes during cardiac arrest, in order to develop novel treatments to improve resuscitative efforts. Both of my supervisors were very supportive throughout the year, which is critical to an engaging and beneficial Honours year.

This project was a great learning opportunity for me, particularly, in helping me to develop my research skills and in understanding this interesting field of research. I found this year to be a very rewarding experience.

If you have any questions about my Honours project or Honours in general, feel free to reach me via email at rodi0002@student.monash.edu or on Facebook.

ABSTRACT

Introduction

Cardiac arrest (CA) is a leading cause of cardiovascular morbidity and mortality, with approximately 26,000 Australians dying annually following CA. Cardiopulmonary resuscitation (CPR) plays a key role in resuscitative efforts, however, haemodynamic changes during CPR are not entirely understood. Furthermore, despite ongoing investment into resuscitative research, there have been no significant inroads made into new treatment modalities that can improve patient outcomes.

Objective

This project aims to investigate haemodynamic changes during resuscitation using pressure-volume catherisation, with the aim of trialling the novel treatment of a resuscitative endovascular balloon in the vena cava to improve outcomes following cardiac arrest.

Methods

A total of 6 female C57BL/6J mice aged 8-12 weeks and 6 Large white pigs aged 10-16 weeks underwent a cardiac arrest protocol including instrumentation of the left ventricle with a pressure-volume catheter. Echocardiography and pressure-volume haemodynamic analysis was performed comparing cardiac function assessed at baseline, during CPR and after return of spontaneous circulation (ROSC; mouse protocol only).

Results

Mechanical CPR in pigs achieved baseline stroke volume (157% ± 96%) and developed pressure (127% ± 46%). Manual CPR in mice achieved baseline stroke volume (101% ± 12%) and developed pressure (112% ± 17%), achieving return of spontaneous circulation (ROSC) in 4 of 6 cases. A resuscitative endovascular balloon occlusion of the inferior vena cava was effective in reducing intracranial pressure, from 23 (25/21) to 19 (20/17) mmHg.

Conclusion

Our study used pressure-volume haemodynamic analysis to confirm that current approaches to CPR by manual compressions in mice and mechanical compressions

in pigs achieve a sufficient maintenance of extrinsically generated cardiac work. We found that a resuscitative endovascular balloon has promise as a clinic-ready device that can be used to improve cerebral venous drainage without compromising haemodynamic function.

Rong (Vivian) Jin

A Monopsony for Commercial Surrogacy: Ethics and Attitudes

Supervisor Names and Institute Affiliations:
Dr Alberto Giubilini (University of Oxford)
Professor Justin Oakley (Monash Bioethics Centre, Monash University)

I completed my BMedSc(Hons) in Bioethics as part of the Monash-Oxford Bioethics Program. I always found ethics tutorials to be engaging and stimulating, and after two years of placements in a fast-paced, clinical environment, I wanted to take some time to explore a different aspect of medicine, through reading and writing. No matter which area of medicine one decides to pursue, having basic knowledge of bioethics would always be a valuable asset; since I am interested in O&G, I decided to delve deeper into reproductive ethics.

Despite challenges and hiccups along the way, this year was overall very rewarding and helped me to gain new skills in, for example, applying for ethics approvals, designing surveys, appraising literature, ethical and statistical analysis and academic writing. Plus, being able to complete the year in Oxford was a truly incredible experience. There was always a plethora of seminars and talks happening and different co-curricular activities to get involved in, not to mention the many college events and opportunities to meet people from around the world. I am extremely grateful to everyone who made this year possible, and so special. I am happy to be contacted by future students with questions.

ABSTRACT

Background

Surrogacy involves a woman carrying a baby for others who are unable to do so for medical, social or other reasons. This may provide the opportunity for involuntarily childless individuals to have genetically related children, which for some people, may be central to realizing their procreative, and even life, goals. Surrogacy is becoming more common, although the ethical and legal aspects of the practice are constantly under scrutiny. In the UK, only altruistic (unpaid) surrogacy is legal (this legislation is currently being reviewed); however, recently, some authors have suggested that commercial surrogacy arrangements may be ethically justifiable.

A monopsony is where there are multiple sellers, but only one buyer for something. In the literature on organ selling, another body-commercializing practice, some bioethicists have argued that establishing a monopsony could allow the creation of an ethically defensible organ market. The idea of a monopsony for commercial surrogacy has not yet been explored in depth.

Aims/ Methods

This project aims, firstly, to examine public attitudes about payment for surrogates and about whether a monopsony for commercial surrogacy is ethically justifiable. The second aim is to integrate empirical data with normative claims and perform an ethical analysis to devise a framework that can provide ethically justifiable payment to surrogates.

An online, experimental survey of a sample of the UK public was conducted. The survey assessed participants' judgements about ethical considerations regarding exploitation, coercion and commodification, and about arguments evaluating a monopsony for commercial surrogacy. Hypothetical vignettes enabled further investigation of whether respondents had strong concerns about payment being coercive. Through the process of Collective Reflective Equilibrium in Practice, public intuitions were compared with philosophical theories to identify areas of consensus.

Results

The survey collected 122 valid responses. Over half of participants (58.2%) supported a monopsony for commercial surrogacy as an ethically acceptable solution to the growing demand for surrogates. Most respondents (74.6%) agreed with ethical arguments claiming that surrogates may be wrongly exploited if they are inadequately compensated for the risks and burdens that they endure. Many participants (71.2%) expressed concerns about coercion, and 53.3% believed that there should be a cap on payment for surrogates. Participants' agreement with a monopsony having the potential to increase the pool of available surrogates, reduce harms of an unregulated market, and minimise risks of coercive payment independently predicted overall agreement with a monopsony, and this is consistent with normative arguments on the benefits of incentivized and regulated models, such as a monopsony.

Conclusions

My findings suggest that the current UK model of altruistic surrogacy may potentially be exploiting surrogates' altruistic motivations, and instead, favours some form of regulated commercial surrogacy, such as a monopsony. Ultimately, I argue that there is strong empirical and ethical support for establishing a monopsony for commercial surrogacy, through which some fixed minimum base pay with a limit on payment for surrogates (to mitigate risks of high payments being coercive) can be implemented. This research may contribute constructively to discussions on how to devise ethically justifiable payment for surrogates.

Ryan Kua

A Multicentre Multinational model: Predicting seizure freedom in patients with newly diagnosed epilepsy

Supervisor Names and Institute Affiliations:
Dr Zhibin Chen, PhD, MBiostat, Bsc(Hons)
Research Fellow, School of Translational Medicine, Monash University
Professor Patrick Kwan, MB, BChir, PhD, FRCP, FRACP, FAHMS
Professor of Neurology and NHMRC Leadership Fellow, Monash University

Hi! My name is Ryan, a 4th year undergraduate student at Monash. I completed my BMedSc(Hons) after Year 4C. I completed my project at the Department of Neuroscience at the School of Translational Medicine (STM). I chose to complete this year due to a multitude of reasons. First, a general curiosity for research, and second, a desire to explore statistics and machine learning. Having the opportunity to learn and apply these skills to a project was an exciting prospect. I have learned many skills through my project, and have found the time to devote myself to other aspects of my life, research, medical or otherwise.

An honours year is no small undertaking, and though you may be free in certain times of the year, the business of honours comes and goes in waves, and you can easily fall under the stress of work and deadlines, speak up and find your support network early. I think it is also crucial to find supervisors who are supportive, friendly and communicative. 'It is so true that your supervisors, rather than your project, make or break your year.

I am happy to be contacted at rkua0003@student.monash.edu if you have any questions.

ABSTRACT

Background

Early treatment of epilepsy is crucial to improve patient quality of life and reduce future seizure burden. The timepoint of the first initial medication in newly diagnosed patients is most useful, providing insight into the performance of 80% of the epilepsy cohort. However, there is a paucity of research which attempts to create a clinically applicable score to perform this task.

Method

6668 patient cases were extracted from EpiCFAIR, a multinational database with 13 active sites across 8 countries. Longitudinal data was included, which in some cohorts extended from 1982-2024.

17 clinical features and 1st ASM information were analysed. Complete case analysis (4610 cases) was used in risk ratio analysis and predictive modelling and compared to an imputed dataset to assess the viability of this approach. Cases under 12 years old were excluded.

Treatment outcome and baseline characteristics of our cohort were examined using basic descriptive statistics across focal and generalized epilepsy subgroups. Next, risk ratios were calculated for each clinical variable to seizure freedom at initial treatment using modified Poisson regression.

Finally, a logistic regression was created with an adaptive LASSO to predict seizure freedom at initial treatment. This model was then translated into a risk prediction score, applied to a test cohort, and performance measured.

Results

6668 patient cases (55% male, 45% female) were extracted and analysed, and the most common age category was 19-40 (46.5% of patients).

Patients with focal epilepsy had a higher prevalence of pretreatment seizures greater than 5 (44.7% vs 28.8%), cerebrovascular disease (10.6% vs 2.5%), and a higher occurrence of abnormal (24.9% vs 7.9%) and epileptiform (23.1% vs 10.5%) MRI findings.

Seizure freedom was achieved by 45.8% of patients from their first ASM trial, with a higher likelihood of this in those with generalized epilepsy compared to focal epilepsy (55.4% vs. 42.3%).

In risk ratio (RR) analysis, for focal epilepsy, seizure onset at age 61+ (RR: 1.26, 95%CI: 1.13-1.42, p<0.001) was associated with seizure freedom, whilst factors like an epileptiform MRI finding (RR: 0.83, 95%CI: 0.75-0.92, p<0.001) was associated with poor seizure freedom outcome.

Factors such as a high (>5) number of pretreatment seizures (RR: 0.8, 95%CI: 0.75-0.85, p<0.001), drug abuse (RR: 0.65, 95%CI: 0.51-0.82, p<0.001), psychiatric comorbidity (RR: 0.74, 95%CI: 0.66-0.83, p<0.001), and focal disease (RR: 0.89, 95%CI: 0.83-0.96, p=0.001) were associated with poor seizure freedom outcome in all patients.

Finally, the score which we derived from our predictive model achieved an AUC (area under the receiver operating curve) of 0.668 in the test set, predicting for seizure freedom at initial treatment.

Conclusions

Our study represents the first findings to come from an such a large and diverse epilepsy cohort, and supports many trends identified in the literature. Finally, the performance of our score compare well to other risk scores in use (e.g. the CHA_2DS_2-VASc score, ROC AUC = 0.67), suggesting promise for the applicability of our research in clinical settings.

Seiyon Sivakumar

Coronary inflammation in patients with and without standard modifiable cardiovascular risk factors

Supervisor Names and Institute Affiliations:
A/Prof Dennis Wong[1], Dr Andrew Lin[1]
1 Victorian Heart Institute & Monash Heart, Victorian Heart Hospital

Hi, my name is Seiyon, and I chose to undertake a BMedSc(Hons) after completing my 4th year of medicine. I chose to complete an honours year to explore my interest in cardiology and gain more exposure in research. During my honours year at the Victorian Heart Hospital, I had the opportunity to learn about the entire research process, from the literature review to data collection and analysis. It has been an incredibly rewarding journey, and I would like to thank my supervisors for their guidance throughout this project. I'm happy to be contacted by future students who may have questions (email: seiyon1010@gmail.com).

ABSTRACT

Background

Coronary artery disease (CAD) remains the leading cause of mortality worldwide. Significant progress in reducing the incidence of CAD has been achieved by addressing "SMuRFs": standard modifiable cardiovascular risk factors which include hypertension, hyperlipidaemia, diabetes mellitus and smoking. However, there is a growing incidence of CAD occurring in the absence of SMuRFs, a phenomenon now termed "SMuRF-less" CAD. Identifying novel biomarkers and mechanisms for SMuRF-less CAD is crucial to uncover new therapeutic targets and prevention strategies for this under-recognised group. The role of inflammation in CAD has been extensively studied and was recently validated as a therapeutic target.

Aims

We sought to compare coronary inflammation in SMuRF-less patients and patients with SMuRFs using pericoronary adipose tissue (PCAT) attenuation, a novel and specific biomarker of coronary inflammation which is quantified on computed tomography coronary angiography (CTCA). Our secondary aims were to compare plaque burden and maximal coronary artery diameter stenosis between both patient groups

Method

This was a retrospective single-centre study of 309 consecutive patients who had underwent clinically indicated serial CTCAs for suspected stable CAD (2010-2016) at Monash Health, Melbourne, Australia. Patients with a past history of CAD (myocardial infarction, percutaneous coronary intervention, coronary artery bypass graft) were excluded. We validated and subsequently used semi-automated software for PCATRCA attenuation measurement around the proximal right coronary artery (RCA). To measure plaque burden, we used the Segment Involvement Score (SIS) and Segment Stenosis Score (SSS). We assessed maximal coronary artery diameter stenosis using the Coronary Artery Disease - Reporting and Data System (CAD-RADS) classification.

Results

Of 309 individuals, 83 (26.9%) were SMuRF-less. The median age was 57.5 years, and 51.8% of the cohort were female. Baseline demographics were similar between SMuRF-less patients and those with SMuRFs, except that patients with SMuRFs were more frequently on statins, ACEi/ARB and aspirin. Our main findings showed that SMuRF-less patients had a similar PCATRCA mean attenuation (HU) to patients with SMuRFs (-77.5 ± 9.5 vs. -78.4 ± 8.9, p = 0.481), despite having a lower plaque burden and a lower maximal coronary artery diameter stenosis.
The mean SIS and SSS were 18.7% and 39.5% lower, respectively, in SMuRF-less patients compared to those with SMuRFs (SIS: 1.78 ± 2.19 vs. 2.72 ± 2.88, p = 0.01; SSS: 2.22 ± 3.36 vs. 3.67 ± 4.38, p = 0.004). Patients with SMuRFs had 2.8-fold higher odds of having obstructive CAD (coronary artery maximal diameter stenosis > 50%) compared to SMuRF-less patients (p = 0.006).

Conclusions

In patients with suspected CAD referred for CTCA, we found that SMuRF-less individuals exhibited a similar level of coronary inflammation as those with SMuRFs, despite having a lower plaque burden and less severe maximal coronary artery stenosis. Our study used PCATRCA attenuation, a local biomarker of coronary inflammation. These findings might explain why SMuRF-less patients still develop CAD and subsequent cardiovascular events. Further research is needed to validate these findings. If confirmed, the therapeutic target of inflammation could be explored further in SMuRF-less patients.

Sewni Samarawickrama

Analysing the human placenta for evidence of fibrin-amyloid particles in disorders of pregnancy including COVID-19

Supervisor Names and Institute Affiliations:
Dr Sarah Marshall and A/Prof Kirsten Palmer
The Ritchie Centre
Hudson Institute of Medical Research
Department of Obstetrics and Gynaecology, Monash University

Hi! I'm Sewni, and I had the privilege of working with Dr Sarah Marshall and A/Prof Kirsten Palmer at the Ritchie Centre during my honours year. After two years of placement, I was interested in experiencing a domain that worked adjacent to clinical medicine, which led me to this honours project. While I found laboratory work challenging, I learnt valuable skills that contributed greatly to my growth as a person. From issues with the study design to optimising staining protocols, this project would not have been possible without the unwavering help of my supervisors and peers from the Ritchie Centre. Although laboratory projects are generally a 9-5 commitment, this year provided increased down time compared to previous years, which allowed me to rediscover my passion for netball. I would highly recommend this program to anyone wanting to experience a different aspect of medicine.

If you have any questions, feel free to contact me via:
Ssam0035@student.monash.edu

ABSTRACT

Background

The adequate development of the placenta, or placentation, is crucial for a healthy pregnancy. In the event of poor placentation, conditions such as preeclampsia and fetal growth restriction (FGR) may develop. Recently, coronavirus disease 2019 (COVID-19) infection has been shown to increase risk of subsequent preeclampsia, calling to question the overlapping disease processes. Prolonged COVID-19 symptoms extending to multiple organ systems is a complication of COVID termed long COVID. In patients experiencing long COVID, misfolded proteins, termed fibrin-amyloid particles, have been discovered. The contribution of these proteins to the post-COVID condition has been theorised, with hypotheses surrounding increased endothelial dysfunction and the increased risk of preeclampsia, a disease characterised by vascular dysfunction. However, the presence of these particles in pregnancy, in patients with and without COVID-19 infection, remains unknown, substantiating the need for research into this area. This study will highlight current knowledge of pregnancy complications including preeclampsia, FGR and COVID-19 and investigate the presence of fibrin-amyloid particles in women diagnosed with COVID-19 in pregnancy.

Methods

Placental samples were obtained from previous research including COVID-positive patient placentae (n=10) and COVID-negative patient placentae (n=8), with relatively uncomplicated pregnancies. For each patient, there were two different placental sections collected, whole sections and four lobe sections from four different villous trees of the placenta. Three different staining protocols were established and optimised, Congo Red, AmyTracker 680 and anti-ß-amyloid antibody staining, although the final stain was established but incomplete due to time constraints.

Once stained, placental slides were blinded and analysed under a microscope for the presence of fibrin-amyloid particles. Three random areas from each slide were selected and average particles quantified per slide and expressed per mm2.

Results

Fibrin-amyloid particles were seen in both placentas of women with COVID-19 in pregnancy and without COVID-19 in pregnancy using the Congo Red and AmyTracker 680 staining methods. This demonstrates that these particles may be found in pregnancy, regardless of COVID-19. There was a non-significant upwards trend in the levels of particles in the control group compared to the COVID-group in the Congo Red-stained whole lobe samples. Whereas, within the Congo Red four lobe sections and the AmyTracker 680 groups, when compared with the control group, the COVID group displayed a non-significant incline in particle levels. The overall levels of particles in the AmyTracker 680 stained sections are drastically less compared to the levels seen in the sections stained with Congo Red.

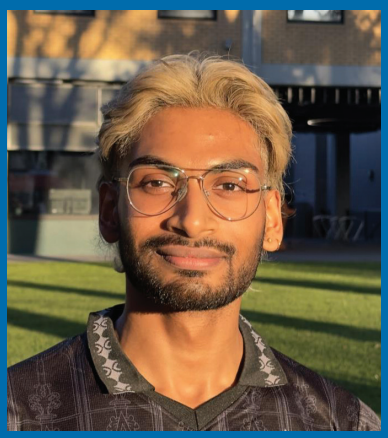
Conclusion

This exploratory pilot study has demonstrated the presence of fibrin-amyloid particles in pregnancy through two different stains, Congo Red and AmyTracker 680. Particles were seen in both control and COVID-19 groups, highlighting that they may be present in pregnancy independently of COVID-19 infection. It is clear that further research is needed to determine the effectiveness of the stains in binding specifically to fibrin-amyloid particles. Additionally, further research needs to establish whether these particles are pathological in pregnancy, exploring the presence of these particles in different patient groups, such as preeclamptic or obese pregnant patients, and any associations to other common comorbidities.

Seyheeran Naidu

Two stage procedures for primary surgical management of cervical cancer: A harm minimisation approach

Supervisor Names and Institute Affiliations:
Dr Benjamin Nowotny
Prof Ben Mol
Department of Obstetrics and Gynaecology, Monash University



After an arduous 4th year, I felt like a small break from clinical medicine was warranted; I wanted to prioritise a year for research and other aspects of my life. I chose a project in gynaecological oncology as I've always had an interest in O&G and wanted to further explore this area before I graduate. My project involved an audit of clinical practices at Monash Health, regarding the management of cervical cancer. A clinical audit allowed me to gain expertise and knowledge in this field, with the results of my project having real-world impacts which would enhance patient outcomes.

I've gained insights into the research landscape, as well as pursued my hobbies and had some valuable time-off from placement. My best advice is to figure out your goals for the year, and then find a project which will suit this. Make sure to have fun along the way!

Feel free to contact me if you have any questions (snai0005@student.monash.edu)!

ABSTRACT

Background

At Monash Health, two stage procedures are often used for primary surgical management of early-stage cervical cancer. In a two stage procedure, patients receive a pelvic lymph node dissection (PLND) prior to their planned hysterectomy. If histopathology of the dissected nodes reveals metastasis, patients will be diverted to primary radiation therapy, whilst those with negative nodes will proceed to definitive surgery. In contrast, a combined hysterectomy and PLND (i.e. one stage procedure) continues to be standard practice and is performed by many institutions. Intellectually, the two stage approach used at Monash Health may be presumed beneficial, as the benefits of a hysterectomy in the presence of lymph node metastasis are limited. However, there is a current paucity of data to support this assumption.

Aim

Our aim was to evaluate the benefits of a two stage procedure compared to a one stage procedure, in patients with early-stage cervical cancer. We intended to quantify the proportion of patients with pelvic lymph node metastasis identified through histopathology which were not detected by PET imaging and were therefore diverted to primary radiation therapy. We also intended to compare patient outcomes following a one and two stage procedure.

Method

This study is a clinical audit and retrospective chart review of patients who have had a PLND as part of primary surgical management for early-stage cervical cancer at Monash Health. Participants were identified from a clinical database, over an 8-year period. Results from diagnostic tests, treatment plans, and patient outcomes, were analysed to compare one and two stage approaches. Descriptive statistical analyses were performed to highlight trends in the data.

Results

There were 120 participants included in our study. Participants with gaps in data were excluded from the relevant sections of this analysis. There were 15.3% of participants with false negatives on their PET scan; nodal status turned out to be positive in 16.7% of non-avid PET scans. Following a PLND as part of a two stage procedure, 27.2% of participants were diverted to primary radiation therapy. The rate of treatment complications was similar between one and stage procedures, whilst the rate of cancer recurrence and death was slightly higher following a one stage procedure. Furthermore, our results show that the use of dual modality treatment does not provide any clinical benefit in preventing cancer recurrence or death. Although our study did not highlight the increased morbidity associated with dual modality treatment following a one stage procedure, it did not consider other factors such as unreported side effects and quality of life. Lastly, our findings indicated that a two stage approach was not associated with a higher morbidity when compared to a combined approach.

Conclusions

At this stage, we can conclude that a two stage procedure may be beneficial over a one stage procedure. Our results show the advantages of this approach for the treatment of early-stage cervical cancer, supporting its continued use at Monash Health.

Shreya Mago

Evaluating the Quality and Utility of Endometriosis Literature (1990-2024)

Supervisor Names and Institute Affiliations:
Dr. Thomas Tapmeier[1,2], Prof Ben W. Mol[1]
Monash University, Department of Obstetrics and Gynaecology
The Ritchie Centre, Hudson Institute

I had the opportunity to complete my BMedSc(Hons) project at the Ritchie Centre this year. Overall, my year has been rewarding due to the breadth of experience I have been exposed to via my project.

My project is essentially research on research, something initially unfamiliar to me. However, it allowed me to become well-acquainted with 'R' programming – which I had no experience or skill in prior to this year, and a skill which I am sure I can use within future research.

Further, having been able to frequently ask questions and learn from my supervisors – skilled and experienced researchers - I feel far more confident in the processes of research, and my own ability to lead a project.

On top of this, I had the opportunity to collaborate with a researcher from Trinity College Dublin to further expand my project, and squeeze in some travel as well!

Whilst I would not recommend a BMedSc(Hons) to anyone simply seeking a break, it is a wonderful (and often more flexible) year if you are seeking to expand your skillset and understanding of an additional facet of medicine.

Happy to be contacted re: any questions about the year!

ABSTRACT

Introduction

Endometriosis presents a significant burden of disease on menstruators worldwide, due to severe symptoms and complications. Research is needed to tackle this issue by generating knowledge on diagnostic tests and treatments. Recently, the burden of endometriosis has received increased recognition on a societal level, resulting in increased prioritisation and funding of endometriosis research. However, it is imperative that emerging research should be high quality and clinically applicable to ensure research efforts translate to patient benefit.

Objective

To evaluate the quality and utility of endometriosis literature between 1990-2024.

Methods

We searched Dimensions.AI, a database chosen for its comprehensive meta-data, for articles pertaining to endometriosis. A database was created, and studies were classified by research type. Global distribution of publications was plotted. We extracted p-values, effect measures and Bayes factors, as well as four major endometriosis classification systems through text-mining using 'R' Programming.

Results

We identified 25471 articles pertaining to endometriosis. Most of these studies have been recent, following a huge growth in endometriosis research in recent years (with a growth of output of 473.4% (472.5-474.4%, 95%CI), from the 1990s to 2020-2023). This is largely accounted for by China's rapid research output, which has increased from an average of 3.8 (1.8-5.8, 95%CI) articles per year in 1991-1995 to an average of 297.8 (235.3-360.3, 95%CI) articles between 2019-2023. Much of this research is 'Basic/Animal Research' (6973 studies), with a comparatively minimal growth in number of Randomised Controlled Trials (RCTs) (577 studies). Further, close to half (49.7% (45.5-53.9%, 95%CI) of endometriosis RCTs in this time would have been unable to detect effect sizes which may have been meaningful to patients, suggesting a significant wastage of resources. Across the literature, poor reporting standards were seen with underutilisation of effect measures (reported in 14.2% (13.2-15.2, 95%CI) of 17087 abstracts) as compared to p-values (35.7% (34.2-37.2%, 95%CI) of 17087 abstracts). Further, there was found to be a strong bias towards the reporting of statistically significant results, with 84.8% (84.2-85.3%, 95%CI) of the 17344 p-values extracted across abstracts found to be statistically significant, and little change was seen over time or between study types.

Conclusion

Despite a substantial increase in endometriosis research in recent times, we have identified addressable issues - such as publication reporting bias and non-adherence to reporting guidelines - within the literature which show minimal change over time and act to undermine efforts and resources invested into endometriosis research.

Taylor Miller

Establishing the therapeutic dose of GILZ via nanoparticle delivery

Supervisor Names and Institute Affiliations:
Associate Professor Sarah Jones and Dr Jia Xin Chow
Rheumatology Research Lab, Centre for Inflammatory Diseases, Monash University

Hi! My name is Taylor, and I choose to undertake a lab-based BMedSc(Hons) in 2024, after completing 4th year in 2023, to explore my interests in rheumatology. Whilst completing an honours year was an intense experience with a huge learning curve at the start of the year, it allowed me to develop my critical thinking and problem-solving skills. Despite many hours spent at the lab, completing an honours year finally have me the time to focus on other pursuits outside of medicine, including training for a triathlon and reading a good book!

If you have any questions, don't hesitate to contact me at tmil0031@student.monash.edu!

ABSTRACT

Background

Systemic Lupus Erythematosus (SLE) is a multi-system autoimmune disease predominately affecting women of child-bearing age. Currently, the management of SLE has remained relatively unchanged, with glucocorticoids (GCs) as the mainstay of treatment. The significant number of adverse effects associated with GCs has highlighted finding an alternative therapy as an unmet need. Glucocorticoid induced leucine zipper (GILZ), a gene that is significantly upregulated during GC use, has been proposed as an alternative therapy. Despite numerous studies suggesting the anti-inflammatory and immune modulatory effects of GILZ, the exact dosage required remains unclear.

Aims

To establish the therapeutic dose of GILZ in cell lines and primary mouse immune cells.

Methods

All experiments were performed using either a cell-line (RAW-ELAM macrophages) or primary mouse immune cells. Prior to TLR stimulation, these cells were delivered either GILZ LNP, control LNP, dexamethasone or no treatment. GILZ LNPs contained mouse GILZ mRNA. Conversely, the control LNPs contained nano-luciferase (NanoLuc) and green fluorescent protein (GFP) mRNA. Some of these cells then underwent TLR stimulation with a selected concentration of resiquimod or lipopolysaccharide. The cells inflammatory response was then investigated by either measuring pro-inflammatory cytokines via ELISA or conducting a luciferase assay, indicating NF-kB activity. Finally, selected samples then underwent either quantitative polymerase chain reaction (qPCR) or flow cytometry to measure GILZ protein levels. For the control LNP, GFP and NanoLuc were measured to indicate uptake into the cell.

Results

Measuring NanoLuc in RAW-ELAM macrophages and primary mouse immune cells after control LNP delivery, indicated that LNP uptake peaks and drops with increasing concentrations. Greatest uptake was seen at moderate to low concentrations, often between 1.5ng/μL and 3ng/μL. Furthermore, both control and GILZ LNP showed a reduction in pro inflammatory cytokine production in RAW-ELAM macrophages and primary mouse immune cells. After statistical analysis, no difference was found between the two groups. Interestingly, minimal increase in Gilz mRNA and GILZ protein was detected, except in RAW-ELAM cells, suggesting LNP uptake may have been compromised in other cell types.

Conclusion

This project laid the groundwork for further studies utilising lipid nanoparticles to identify the therapeutic dose of GILZ. Appropriate cell type, stimulatory conditions and LNP delivery concentration were determined, with good update of LNP mRNA achieved under optimised conditions. GILZ LNP treatment delivered a small increase in GILZ mRNA and protein, and future work will enable LNP-delivered GILZ mRNA to be adequately expressed within cells, allowing the therapeutic dose of GILZ to be determined.

Tessa van Veenendaal

The Digital Surrogate: Ethical and Public Perspectives on Using Large Language Models for Substituted Decision-Making in Healthcare

Supervisor Names and Institute Affiliations:
Dr Julian Koplin: Monash Bioethics Centre, Monash University
Dr Brian D. Earp: University of Oxford

I decided to complete a BMedSc(Hons) at the end of my fourth year to gain valuable research skills and have a break from clinical medicine. I was lucky enough to be accepted into the Bioethics program at the University of Oxford. My project focused on the rapid advances occurring in the use of AI in medicine, and although challenging at times, completing my thesis has been one of the most rewarding experiences of medical school.

Living at Oxford was such an incredible opportunity, and I had the most amazing year being a part of the college life and meeting new people. Exploring philosophy and ethics with some of the brightest minds in the field, whilst trying out new hobbies like rowing, ice skating and wild swimming was such a privilege. I would highly recommend this program to anyone and would be happy to be contacted by future students at tvanvv@gmail.com

ABSTRACT

Background

The substituted judgment principle is central for persons who have lost medical decision-making capacity. Intended to respect these patients' former autonomy, it holds that surrogate decision-makers should attempt to make treatment decisions that the incapacitated patient themselves would have made. However, research shows humans struggle to make accurate decisions in this context. To address this issue, the Personalised Patient Preference Predictor (P4) has been proposed. This is an AI system using Large Language Models fine-tuned on person-specific data to predict treatment preferences for incapacitated patients. Although designed to be more accurate than human surrogates, and thus better uphold patient autonomy, the P4 introduces its own ethical dilemmas.

The overall aim of this thesis was to assess whether use of a P4 was ethically acceptable in substituted decision-making. I first conduct a theoretical analysis, examining existing literature to explore the potential ethical benefits and objections to the P4. I then assess public attitudes towards the P4, particularly how they would want disagreements between algorithmic and humanpredictions resolved.

Method

An online survey of 237 nationally representative UK participants was conducted. Participants were split into two conditions: one where there was said to be a family member available to assist with the substituted decision, and one where there was not, and thus it was solely a clinician. Participants indicated which prediction they would want followed in a hypothetical disagreement between the P4 and the respective human surrogate. Participants were asked how accurate/inaccurate the model would have to be for them to change their preference, their overall attitude toward the P4, and their willingness to authorise certain data sources for algorithmic training purposes. The hypothesis was that participants would favour human predictions but would be more willing to choose the (hypothetically more accurate) P4's prediction when there was no family member present.

Results

The findings revealed that 72.2% of participants favoured adopting the P4's prediction, with higher support when no family was present (83.8%) compared to when family was involved (60.8%). These participants valued the algorithm's accuracy and the possibility of relieving their human surrogate of decision-making burden. Amongst those who favoured humans, there were concerns about using AI in this context and emphasise on the importance of human judgement. Participants who chose humans required the P4's prediction to be highly accurate (Maccuracy=97.68%, SD=2.39) to favour it instead. Overall, participants showed a willingness to involve the P4 in decision-making, but a sizeable number were reluctant to authorise data from social media and personal communications for training purposes.

Conclusions

This novel empirical evidence on public attitudes towards the P4 suggests an openness to new technology in this context. The final section of this thesis draws together the results from the theoretical and empirical sections. Using experimental bioethical frameworks, I conclude that with appropriate implementation, using the P4 as a decision-making aid is ethically desirable for those who want it. This project provides a timely contribution to the empirical and theoretical literature on involving AI in substituted decision-making to work towards an urgently needed solution for incapacitated patients.

Tharushi Sampatha Waduge

Application of Maternal Biomarkers for the Earlier Detection of Pre-Eclampsia

Supervisor Names and Institute Affiliations:
A/Prof Kirsten Palmer (primary)
A/Prof Daniel Rolnik (secondary)
Hudson Institute (The Ritchie Centre)
Department of Obstetrics and Gynaecology, Monash University

My name is Tharushi and I was very lucky to work with A/Prof Kirsten Palmer on investigating the potential use of placental biomarkers for pre-eclampsia diagnosis. I chose this project as it combined research skills such as laboratory work and data analysis alongside practical clinical skills such as history taking, manual blood pressure measurements and venepunctures.

This year was full of wonderful experiences and a great change from clinical placement, especially after a very labour-intensive fourth year. I experienced the challenges and joys of clinical recruiting and made so many friends and colleagues along the way amongst the clinical and administrative staff at Monash Health.

I would highly recommend a clinical research project to any students concerned about losing touch of their clinical skills or wanting every new day to be different to the last – clinical research is challenging but also so rewarding! If you have any questions, please feel free to contact me.

ABSTRACT

Background

Pre-eclampsia is a disease unique to pregnancy, causing significant maternal and neonatal morbidity and mortality. It is a disease diagnosed using clinical features of end-stage organ dysfunction such as hypertension and proteinuria, which means diagnosis occurs well after disease onset. It has also been found that while hypertension in pregnancy is defined as a blood pressure ≥140/90 mmHg, pregnant patients in the new American College of Cardiology stage 1 hypertension criteria (blood pressure 130-139/80-89mmHg) are three times more likely to develop pre-eclampsia than their normotensive counterparts. Placental biomarkers released into the maternal serum have emerged as a possible early marker of disease, as they exhibit change five weeks prior to the clinical presentation of pre-eclampsia. The performance of placental biomarkers in patients with diagnosed or suspected pre-eclampsia has been well established, but there is no information on how these biomarkers perform in patients with stage 1 hypertension criteria alone.

Aim

To investigate the performance of placental biomarkers in diagnosing pre-eclampsia in patients with stage 1 hypertension in pregnancy ≥20 weeks' gestation.

Method:

Patients ≥20 week's gestation with stage 1 hypertension (blood pressure 130-139/80-89mmHg) and no existing pre-eclampsia diagnosis were recruited antenatally at Monash Women's Health sites. Participants completed a demographic survey and donated blood for serum biomarker analysis. All participants were followed up for pregnancy outcomes using their medical records, assessing mainly for the development of pre-eclampsia and delivery outcomes. Patient samples were analysed for concentration of placental biomarkers, sFlt-1 and PlGF, using an automated immunoassay platform (BRAHMS Kryptor). All patient data was stored securely on a REDCap database, and statistical analysis was completed using Stata SE 18.

Results

A total of 81 patients were analysed for this study, with 35 patients diagnosed with pre-eclampsia and 46 patients without pre-eclampsia. There were no significant differences between the two groups in age or parity, although there was a significant difference in BMI that was contrary to what was expected from the literature (29.9kg/m2 in the pre-eclampsia group and 34.6kg/m2 in the no pre-eclampsia group). Placental biomarker levels were significantly different between the two groups for sFlt-1, PlGF and sFlt-1:PlGF as a ratio and showed a moderate ability to diagnose pre-eclampsia in patients with stage 1 hypertension. The individual placental biomarkers also performed better in diagnosing pre-eclampsia in the comorbid groups (chronic hypertension
and diabetes), whereas sFl-1:PlGF performed better in diagnosing pre-eclampsia in non-comorbid groups.

Conclusions

This study shows that placental biomarkers perform differently in patients with pre-eclampsia and patients without pre-eclampsia who had stage 1 hypertension criteria in pregnancy ≥20 weeks' gestation. It is the first study to assess placental biomarker performance in this cohort, and the results show that these biomarkers have a moderate ability to identify patients with pre-eclampsia. This research can be used as the basis for future clinical trials to assess the utility of combining placental biomarkers and stage 1 hypertension criteria for earlier diagnosis of pre-eclampsia.

Yang Liu

Improving Comparison of Acute Stroke Care in Hospitals Based on Mortality After Stroke

Supervisor Names and Institute Affiliations:
Dr Muideen Olaiya, Dr Joosup Kim, Stroke and Ageing Research Group
Monash University

Hi! My name is Yang and I undertook my honours year at the Stroke and Ageing Research Group at the Victorian Heart Hospital. My honours thesis involves utilising machine learning methods for risk adjustment methods for comparing hospital performance. Application of a machine learning prediction model on a large scale, within the Australian Stroke Clinical Registry was an interesting first step into the world of research for me.

Going into this year with basically no coding experience, it was tough but extremely rewarding to learn the skills of the trade. I learnt how to use R and python throughout the year which was honestly not as hard as I would have expected. There were always challenges and roadblocks along the way but the supportive team at the research group and the plethora of online resources allowed me to come out the other side a much more confident coder. By the end of the year, I realised that machine learning and coding aren't as daunting as I had originally thought they would be.

Feel free to contact me via yliu0345@student.monash.edu if you have any questions!

ABSTRACT

Background

Stroke remains a leading cause of morbidity and mortality within Australia, resulting in a significant economic burden on the healthcare system. Clinical quality registries are increasing being used to monitor the quality of acute care and outcomes of stroke. Data from these registries are used to evaluate indicators of hospital performance on stroke care, e.g., risk-adjusted mortality rates (RAMRs). However, current methods for calculating RAMRs in the Australian Stroke Clinical Registry (AuSCR) may be limited due to inherent limitations of registry data (e.g., data wastage due to missing data) and limitations in adjusting for patient case-mix. Machine learning (ML) methods have the potential to overcome these limitations. In this study, I aim to explore the utility of new methods (i.e., ML methods) over current regression methods used in the AuSCR for reliable comparison of hospital performance using RAMRs.

Method

Retrospective cohort study using patient-level data collected in the AuSCR. Data from hospitals with >300 episodes of care/year from 2020-2022 were included. The risk of mortality after stroke was determined using ML models and generalised linear models (GLMs). Specifically, ML models with capacity to better handle missing data (e.g., random forest and XGBoost) were compared with GLMs with missing data imputed. Models were compared using metrics, such as root mean square error (RMSE), C statistic (ROC-AUC) and binary cross entropy (log loss).

Results

Of 42 eligible hospitals (range 318-2499 care episodes/year), there were 32,574 episodes (median age 76; 56% male; 77% ischaemic stroke). Unadjusted mortality rates for hospitals ranged from 2.2-16.1%. Due to better handling of covariates, ML models performed better than GLMs. Data imputation in GLMs did not appropriately address the heterogenous distributions of risk between patients with and without missing data. The best performing ML model (XGBoost) outperformed the GLM: c-statistic 0.8712 vs.0.8172, RMSE 0.2660 vs. 0.2831, and log loss 0.2339 vs. 0.2719. Hospital-specific RAMRs ranged from 5.3-15.7%. The rank of some hospitals changed substantially when comparing the RAMRs based on ML models and GLMs. High performing hospitals performed better in certain clinical quality indicators such as provision of secondary prevention medication but did not perform better in other aspects such as proportion of patients receiving stroke unit care.

Conclusions

ML models outperform traditional methods, such as GLM in the handling of missing data (often associated with registry data) and better adjustment for patient case-mix, when evaluating hospital performance based on RAMRs. Importantly, ranking of hospitals varied considerably using ML methods, compared to the less robust GLM.

Ian Wang

Micronutrient Deficiencies in Patients with Cirrhosis

Supervisor Names and Institute Affiliations:
Dr Rohit Sawhney, Dr Stephen Bloom | Eastern Health Clinical School
Monash University

Hey everyone! I'm Ian and I completed my BMedSc(Hons) year at Eastern Health Clinical School in 2024. An honours year to me was the missing jigsaw piece to my medical education. The first four years equip us excellently with clinical skills and knowledge, but in my humble opinion, less sufficiently with the skills to synthesise new knowledge and advance the way we care for patients.

My project was a clinical prospective study, requiring frequent patient contact, taking surveys, examinations and analysing laboratory tests-a perfect way to learn about research whilst not forgetting my clinical skills from my first four years. I've had the opportunity to work closely with the department, attend any gastro-related activities and get to know the consultants, registrars and nurses. All this while travelling, picking up new hobbies and spending time with friends. I'm leaving this year much more informed about where the things we learn come from, the diligence often demanded in research and the intricacies of statistical analysis, patient recruitment and everything in between. My advice would be to take charge of your own learning-what you put in is what you get out. Happy to be contacted by future students for a chat. My email is ywan0355@student.monash.edu

ABSTRACT

Background

Patients with cirrhosis have an increased risk of malnutrition, which is associated with worse prognostic outcomes and comorbidities. Micronutrient deficiencies are prevalent in cirrhosis in many countries and are associated with complications such as decompensation and death. However, the benefits of supplementing these deficiencies remain poorly understood.

Aim

We investigated the effects of micronutrient supplementation on cirrhosis severity, nutritional status and quality of life as well as the prevalence of micronutrient deficiencies, in cirrhotic patients in Australia.

Method

Patients were recruited consecutively between January 2022 to June 2024 from three tertiary hospitals' liver clinics. All consenting patients diagnosed with cirrhosis were eligible. Baseline assessments were conducted at the initial consult including routine bloods, micronutrients biochemistry, the SF-36, RFH-NPT, SGA and handgrip strength. Patients then returned with blood test results and any deficiencies were supplemented for six months according to an evidence-based protocol, before returning for a final follow-up to repeat all assessments. We used validated scores such as the Child-Pugh, MELD and FIB-4 scores to quantify disease severity. Validated questionnaires such as the SF-36 and RFH-NPT were used to stratify quality of life and nutritional risk, respectively. Statistical analysis was completed using the Wilcoxon Signed rank test, paired t-tests and chi-squared tests to assess for differences between outcome variables at baseline and follow-up. To determine the impact of supplementation on outcome variables, multilevel linear mixed models were used.

Results

A total of 152 patients were included for this study. The median age was 63 years and 35.5% were female. In our cohort consisting of mostly Child-Pugh class A (68.4%), some B (27%) and C (4.6%) patients, the most common deficiencies were zinc (69.7%), vitamins A (43%), C (34.6%) and D (30.3%). Vitamins A and D supplementation correlated with a decrease in Child-Pugh score ($p=0.005$ and $p=0.044$, respectively). Vitamin D, magnesium and iron correlated with an increase in handgrip strength ($p=0.019$, $p=0.029$ and $p=0.041$, respectively). Magnesium was related to improved emotional wellbeing ($p=0.004$), but other supplements such as B-group vitamins, C, D and iron were associated with decreased quality of life metrics in the SF-36. Vitamin B1 and C replacement unexpectedly correlated to an increase in the MELD and FIB-4 scores. There was no relationship between supplementation and the RFH-NPT and SGA.

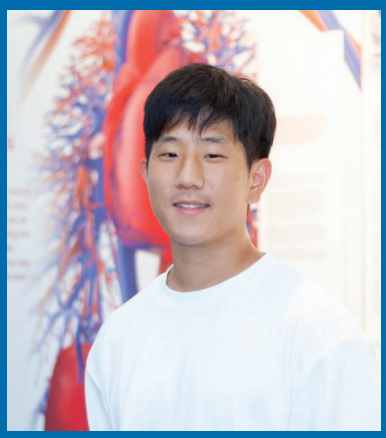
Conclusions

This is one of the first Australian studies to comprehensively look at the prevalence of micronutrient deficiencies in cirrhosis and assess the benefit of taking multiple concurrent supplements. Vitamins A, D, magnesium and iron supplements were generally related to improvements in cirrhosis severity and nutritional status whereas B-group vitamins and vitamin C supplements were related to decreased quality of life or worsening cirrhosis. These results show that certain supplements may improve or decrease nutritional status when taken for at least 6 months, but larger future studies are needed to ascertain this.

Yoonpyo Brian Lee

Role of succinate in heart failure with preserved ejection fraction.

Supervisor Names and Institute Affiliations:
Prof. David Kaye
Assoc Prof. Bing Wang
Dr Ruth Magaye
Baker Heart and Diabetes Institute
School of Translational Medicine, Monash University



I did my BMedSc(Hons) after 4th year of medicine. Having done a lab-based project, this year was certainly difficult, with countless unexpected results and experimental problems. Despite this, I'd say this was one of the most valuable years in terms of the understanding I gained in medical research and the amount of work that goes into each piece of result within a study. This year also developed my ability to think analytically with scientific rigour and view scientific papers with a new perspective. While it isn't easy, lab-based projects provide a unique opportunity to get involved with so many experiments and is definitely a rewarding experience.

ABSTRACT

Background

Heart failure with preserved ejection fraction (HFpEF) is a complex clinical syndrome, and its phenotypical heterogeneity has obstructed the development of effective therapy. However, with metabolic remodelling recently emerging as a novel paradigm, succinate, an intermediate metabolite of the tricarboxylic acid cycle, has gained attention as a potential mediator of this disease. Its additional role as a signalling molecule through GPR91 has made it a subject of particular interest. Here, we investigate the dysregulation of succinate in the plasma of HFpEF patients and explore its role in driving common pathological changes of HFpEF, fibrosis and hypertrophy, in cardiac cells.

Method

Plasma samples were procured from the coronary sinus (CS) and peripheral arteries (ART) of 12 HFpEF patients and 6 healthy controls. Succinate concentrations were compared between groups at each site, and transcardiac gradients were established by subtracting arterial levels from the coronary sinus levels for each group. We complemented this with an in-vitro investigation where neonatal rat cardiomyocytes (NCM) and cardiac fibroblasts (NCF) were cultured and treated with succinate to assess its effect on hypertrophy and collagen synthesis, respectively, at the protein level. Next, GPR91 involvement was examined using C2, a novel GPR91 antagonist. Then, we harvested the RNA of these cells and quantified the expression of hypertrophic and fibrotic genes using RT-PCR.

Results

In clinical samples, succinate was elevated at both sites in HFpEF patients compared to healthy controls (CS p=0.005; ART p=0.015). Furthermore, HFpEF patients demonstrated a negative transcardiac gradient, indicating a significant extraction of succinate by the heart (p=0.01). In-vitro, succinate significantly stimulated hypertrophy in NCM and collagen synthesis in NCF at 100μM and 50μM, respectively ($p<0.0001$ for both). Meanwhile, C2 administration did not inhibit succinate's effect in either cell, though NCM demonstrated hypertrophic reversal with a shorter treatment duration. RT-PCR showed no transcriptional changes with succinate; however, C2 treatment paradoxically increased the expression of BNP (p=0.01), while fibrotic markers remained unchanged. Interestingly, post-hoc time-course analysis revealed temporal variation of succinate's effects.

Conclusions

Elevated succinate concentrations in HFpEF patients, along with its pathological role in cardiac hypertrophy and fibrosis, position it as a novel biomarker and therapeutic target of HFpEF. However, GPR91's exact role remains indeterminate. Future studies investigating succinate's causal relationship with HFpEF and the mechanisms underlying its cellular effects are essential to clarify succinate's contribution to the pathophysiology of HFpEF.

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