

## Abstracts of Theses Approved for the PhD/MMed/MSc at the School of Medical Sciences, Universiti Sains Malaysia, Kubang Kerian, Kelantan, Malaysia

### EXPLORING MENTAL TOUGHNESS AND PERCEIVED STRESS OF NURSING STUDENTS OF UNIVERSITI SAINS MALAYSIA

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**Introduction:** Possessing mental toughness (MT) enables one to bounce back from adversities, feel confident in completing tasks and be assertive in social situations while remaining committed in the face of stress. Stress can serve as a driving force, but too much stress can cause poor performance and stress-related disorders. In higher levels of education and beyond, the predictive value of cognitive ability for performance decreases. In reverse, non-cognitive individual differences become increasingly important during high-stake situations. Burnout from stress is a serious issue in the nursing profession leading to attrition and can affect the performance of quality healthcare. Nursing students are vulnerable groups with higher risk of burning out, with anxiety and self-efficacy being among the strongest intrinsic predictors of stress. MT is a dispositional trait encompassing the characteristics of being resilient and more, hence, it deems fit for MT to be introduced into the nursing context as an effective stress-coping mechanism. The 4/6Cs MT model developed by Clough et al. (2002) is the most referred concept of MT, with a measuring tool called the Mental Toughness Questionnaire-48 (MTQ-48) encompassing dimensions namely Challenge (CH), Commitment (CM), Emotional Control (CE), Life Control (CL), Confidence in Abilities (CA) and Interpersonal Confidence (CI). One method of investigating MT is to examine how different individuals respond to emotional stimulation in specific situations. Therefore, it is essential to establish a technique or procedure to evaluate and further comprehend the idea of MT, such as cognitive effort related tasks, stress tasks, or emotional stimuli paradigm. Due to the paucity of emotion and neuroimaging research on MT, it is worthwhile to investigate which paradigm is best for assessing MT in the nursing context. Different individuals may develop vastly diverse stress responses to the same stressor and this variation may be attributable to varying psychological resilience. MT has not been explicitly studied in the context of nursing students hence this research was carried out to contribute to the gap in research.

**Objectives:** This study aimed to explore the suitability of MT in the nursing context and identify stressors pertaining to the current study's population of interest and pin-pointing visual themes useful for developing exploratory stress-coping

neuroimaging paradigm suited for healthcare education context. Specific objectives include:

- i) To measure the MT of USM nursing students using MTQ48.
- ii) To assess the relationship/examine the correlation between MT(MTQ-48) and anxiety and self-confidence (NASC-CDM).
- iii) To determine the factor structure and internal consistency of mental toughness questionnaire hence/so it could be used as a valid and reliable instrument to measure MT.
- iv) To validate a selection of images perceived as stressful by nursing students using valence-arousal rating.
- v) To explore the relationship between MT and perceived emotional stress.
- vi) To identify stressful images as visual stimuli that correlates MT and perceived stress for MT-based neuroimaging study.

**Materials and Methods:** This research is an exploratory and descriptive study using a cross-sectional study design, broken down and carried out in three phases with nursing students from Universiti Sains Malaysia (USM): 1) Phase One is a pilot study that involves assessing MT and establishing the link between MT with self-confidence and anxiety (NASC-CDM) by using correlational design to explore the correlation between these variables among nursing students, model validity and reliability testing were also carried out to provide support for the factorial validity of MTQ-48 in the nursing context using Confirmatory Factor Analysis (CFA); 2) Phase Two utilises the Self-Assessment Manikin (SAM) pictographic scale accessing emotion in independent affective spaces such as valence and arousal in rating the valence (happy/pleasant feelings) and arousal (stimulated feelings) of affective pictures from several databases in relation with situational academic and clinical settings; lastly, 3) Phase Three involves stress-rating of images using a Visual Analogue Stress Scale for the subjects to rate stress scores of images, done concurrently with the assessment of perceived stress and MT using the Perceived Stress Scale (PSS-10) and the Mental Toughness Questionnaire (MTQ-10), Pearson's Correlation was administered for analysis of correlation between variables.

**Results:** Findings from this research show MT have fair to moderate significant correlations with Anxiety ( $r = -0.293, p < 0.001$ ) and Self-Confidence ( $r = 0.429, p < 0.001$ ). The initial 48-item MTQ-48 has good reliability with Cronbach's coefficient alpha of 0.851 but reported unsatisfactory fit across indices after running confirmatory factor analysis (CFA). After refining the items, a modified 10-item Mental Toughness Questionnaire (MTQ-10) presented decent reliability ( $\alpha = 0.789$ ) achieving all recommended minimum values for CFA fit indices. Characteristics of burnout were expressed in the final items

in MTQ-10 from the Commitment (CM) domain whereas items in both Emotional Control (CE) and Life Control (CL) reflected feelings of anxiousness and helplessness of not having control over circumstances and having trouble in regulating emotions. Items in the Challenge (CH) domain reflected positivity and optimism when facing challenges and adaptability. In Phase One it was also observed from the assessment of MT of degree nursing students, Year 1 students mostly scored average to high levels of MT, whereas most students in Year 2 and Year 3 were found to report low levels of MT. Literature suggested that new and unfamiliar experience faced by the students caused them to display greater levels of stress and changes of behaviour during their second year of training. Image validation in Phase Two via Self-Assessment Manikin (SAM) yielded 36 images with low valence and low arousal reflecting stressful emotions when viewing the images, most of them consisting of academic related images that contains elements such as books, classrooms, study/exam halls etc., and the rest are images portraying negative emotions, clinic-related images, and miscellaneous scenarios. Finally in Phase Three, concurrent stress-rating of images with assessment of MT and perceived stress reported 31 images have significant correlation with both MT and perceived stress, with strong significant negative correlation between total MT scores and perceived stress scores ( $r = -0.768, p < 0.001$ ). Characteristics of MT are directly contrasting from the subscales of PSS-10 items which are perceived helplessness over lacking the sense of control over circumstances, emotions or reactions, and lack of self-efficacy or the perceived inability to handle problems, this is supported by literature reiterating that perceived stress negatively and strongly associates with MT, higher MT individuals might perceive lower stress. Evidence in literature points to the need for burnout prevention training to be implemented starting in the academic setting, hence, this current research suggests that building MT from early academic stage might be needed as to possibly support nursing students in their course of training and development in academic and clinical efficacy.

**Conclusion:** From this research we managed to test out the suitability and reliability of the 4/6Cs MT model in the nursing student context through the MTQ-48 psychometric measuring tool and yielded a more refined questionnaire MTQ-10 from the pilot study. This research also reported significant positive correlation observed between MT and self-confidence, significant negative correlation between MT and anxiety, and strong significant correlation between MT and perceived stress. Academic stress was a predominant visual theme identified to be perceived as stressful and inducing negative emotions amongst the nursing students. By establishing the relationships explored in this study, this research contributes to laying a foundation for further investigation utilising neuroimaging methods to provide body of evidence from neurobiological and psychosocial frameworks to be extended into the existing models of MT in the context of healthcare and nursing education for future development of interventions and/or improved MT training for nursing students in hopes to reduce frequencies of burnout and attrition of nurses.

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## DEVELOPMENT OF KNOWLEDGE, AWARENESS, AND PRACTICE QUESTIONNAIRE ON SAFETY AND EMERGENCY RESPONSE AND ASSESSING FACTORS ASSOCIATED WITH DIVING-RELATED ILLNESS AND INJURY AMONG RECREATIONAL SCUBA DIVERS IN MALAYSIA

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**Background:** Recreational scuba diving, an adventurous sport, poses inherent risks like high-pressure environments and buoyancy changes, impacting divers' well-being. While the undersea journey is captivating, safety hinges on strong foundations in knowledge, awareness, and safety practices. Assessing divers' KAP is crucial, highlighting the need for ongoing improvements.

**Objectives:** To develop and validate a new questionnaire assessing the knowledge, awareness, and practice of safety and emergency response among scuba divers in Malaysia, and to determine factors associated with good KAP. Additionally, the study aims to investigate the prevalence of diving-related injury and illness, along with its associated factors.

**Materials and Methods:** This study, spanning November 2022 to December 2023, had two phases. Phase one involved 555 scuba divers, aimed to develop and validate a questionnaire using literature review, expert opinions, existing questionnaires, and a theoretical framework. Validation involved item response theory (IRT) for knowledge and exploratory/confirmatory factor analysis (EFA/CFA) for awareness and practice. In phase two, a cross-sectional study surveyed 407 divers from ten centres in Tioman and Perhentian Islands, employing the new questionnaire.

**Results:** A validated 42-item questionnaire, demonstrating good internal consistency (Cronbach's alpha: 0.77–0.80). Composite reliability, however, fell slightly below the threshold (Raykov's rho: 0.55–0.71). The model fitness for the knowledge component was confirmed through modified parallel analysis, revealing an RMSEA of 0.02 (95% CI = 0.005, 0.03). Meanwhile, for awareness and practice, the fitness indices were deemed satisfactory: SRMR = 0.04, RMSEA = 0.03–0.04, CFI = 0.98, TLI = 0.96–0.97. In phase two, diving-related injury/illness prevalence was 26.1%, predominantly barotrauma (17.9%). Mishaps were reported at 51.4%, mainly due to equalisation problems (40.8%). KAP assessment revealed that 91.8% had good knowledge (mean score: 17.8, SD = 2.08), 93.1% had good awareness (mean score: 4.37, SD = 0.41), and 85% exhibited good practice (mean score: 4.11, SD = 0.44). Factors associated with good knowledge included education level (adjOR: 3.13; 95% CI: 1.03, 9.46;  $p = 0.044$ ) and diving depth (adjOR: 0.40; 95% CI: 0.18, 0.90;  $p = 0.027$ ). Dive frequency was a significant factor for good awareness (adjOR: 0.20; 95% CI: 0.05, 0.89;  $p = 0.034$ ). Diving-related injury and illness were associated with increasing height (adjOR: 1.37; 95% CI: 1.00, 1.88;  $p = 0.050$ ), weight (adjOR: 0.68; 95% CI: 0.46, 0.99;

$p = 0.045$ ), elevated BMI (adjOR: 3.14; 95% CI: 1.06, 9.30;  $p = 0.039$ ), and certification level (adjOR: 3.78; 95% CI: 1.68, 8.49;  $p = 0.001$ ). Mishaps were associated with increased weight (adjOR: 1.03; 95% CI: 1.01, 1.05;  $p = 0.008$ ) and certification level (adjOR: 6.08; 95% CI: 2.20, 16.84;  $p = 0.001$ ).

**Conclusion:** The newly developed questionnaire has been proven to be valid and reliable for assessing scuba divers' KAP in safety and emergency response. Scuba divers possess good knowledge, awareness, and practice in safety and emergency response, underscoring their commitment to safety. Dive-related injuries/illnesses among scuba divers were slightly lower than in the previous study, whereas the prevalence of mishaps was higher compared to earlier studies. Targeted group interventions have the potential to improve prevention and intervention strategies, providing efficient benefits to scuba divers.

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## **INFLUENCE OF WORKPLACE VIOLENCE ON RESILIENCE AMONG SELECTED PUBLIC HEALTH WORKFORCE IN TERENGGANU**

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**Background:** Workplace violence is a globally recognised issue, impacting on all employment sectors, particularly the health sector where healthcare workers face a higher risk. Concurrently, resilience, defined as individuals' ability to adapt to diverse adverse situations while maintaining well-being, is crucial for Public Health Workforce (PHW) confronting workplace challenges.

**Objective:** This study aims to examine the relationship between low resilience levels and workplace violence exposure, individual characteristics, job characteristics, and the psychosocial work environment among PHW in Terengganu.

**Methodology:** This cross-sectional study, conducted from May 2022 to October 2023, included all eight district health offices and government health clinics in Terengganu. The participants in the study were selected using random sampling. Data was collected using three self-administered questionnaires which were the Malay version Job Content Questionnaire (M-JCQ), Workplace Violence in the Health Sector ILO/ICN/WHO/PSI Questionnaire, and Connor-Davidson Resilience Score (CD-RISC 10) Questionnaire. Multiple logistic regression analysis was applied to determine the associated factors for low resilience among participants.

**Results:** The study included 1044 participants with a response rate of 92% with a mean (SD) age of 37.24 (7.64) years. Mean (SD) scores for decision latitude, psychological

job demand, physical job demand, and social support were 70.70 (10.61), 22.91 (3.11), 11.4 (3.00), and 25.47 (3.77) respectively. Married individuals, high score for decision latitude, physical job demand, and social support were significantly associated with WPV (Adjusted OR 0.54 (95% CI: 0.37, 0.81), 1.03 (95% CI: 1.01, 1.04), 1.06 (95% CI: 1.06, 1.11) and 0.90 (0.87, 0.94),  $P$ -value < 0.05 respectively). Logistic regression revealed that, in addition to higher score of decision latitude (Adjusted OR 0.98 (95% CI: 0.97, 0.99),  $P$ -value = 0.02), higher score for psychological job demand (Adjusted OR 0.83 (95% CI: 0.78, 0.88),  $P$ -value < 0.001) and higher score for social support (Adjusted OR 0.92 (95% CI: 0.88, 0.95),  $P$ -value < 0.001), Exposure to WPV also significantly associated with low resilience levels (Adjusted OR 1.48 (95% CI: 1.09, 2.00),  $P$ -value = 0.013).

**Conclusion:** The study identified key factors associated with low resilience levels among PHWs, including workplace violence exposure and psychosocial work environment elements such as high score of decision latitude, psychological job demand, and social support. Addressing workplace violence is crucial, given its significant relationship with low resilience levels. Educational programmes and awareness campaigns can foster a culture of respect and zero tolerance for workplace violence. Efforts should also focus on strengthening decision latitude and social support within the psychosocial work environment, fostering a cooperative and supportive atmosphere among PHWs.

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## **THE PROGNOSTIC AND PREDICTIVE MODELLING OF MORTALITY AMONG ACUTE STROKE PATIENTS IN PENINSULAR MALAYSIA**

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**Introduction:** The rapid evolution of digital technology and artificial intelligence has revolutionised the application of machine learning in predicting stroke outcomes. The increasing burden of stroke in Malaysia, characterised by its impact on mortality and morbidity, underscores the need for accurate mortality prediction models. This need is heightened by the challenges in clinical decision-making and prognostic management, driving the development of various prognostic models and tools.

**Objectives:** This study aimed to analyse trends in publications related to the application of machine learning in stroke outcome modelling, identify prognostic factors,

perform predictive modelling for mortality among acute stroke patients, and develop a web-based application for stroke mortality prediction using data sourced from multiple stroke centres in Malaysia spanning the years 2016 to 2021.

**Material and Methods:** Our methodology spans a multifaceted approach: starting with a bibliometric analysis using Scopus and Web of Science data, followed by a retrospective cohort analysis of 950 stroke patients across five hospitals in peninsular Malaysia. We utilised survival analyses and an array of predictive modelling techniques, including Cox regression, Support Vector Machine (SVM), and Random Survival Forest (RSF). The development of Malaysian Ischaemic Stroke Mortality Prediction Tool (MIST) involved a rigorous process of content and face validation with domain experts and users.

**Results:** The bibliometric analysis delineated a robust trend in machine learning research in the realm of stroke, punctuated by significant global collaborations. The retrospective study revealed a mean stroke onset age of 63.15 (13.09) years, with a male ( $n = 552$ , 58.1%) and Malay ethnicity ( $n = 771$ , 81.7%) predominance and a higher predictive precision of the National Institute of Health Stroke Score (NIHSS) scale (higher statistical significance, lower Akaike Information Criterion (AIC) values, a higher C-Index, and a more gradual decline in Kaplan-Meier survival curves) over Glasgow Coma Scale (GCS) for stroke-related mortality. Notably, the SVM model demonstrated superior predictive accuracy, evidenced by 3-month, 1-year, and 3-year time-dependent Area Under the Curve (AUC) values of 0.842, 0.846, and 0.791, a D-index of 5.31 (95% CI: 3.86, 7.30), a C-Index of 0.803 (95% CI: 0.758, 0.847), and Brier scores ranging from 0.103 to 0.220. MIST, following comprehensive validation, was highly acclaimed by experts and users for its predictive accuracy and user-friendliness with Scale-Level Content Validity Index (S-CVI/Ave) and Scale-Level Face Validity Index (S-FVI/Ave) of 0.99 and 0.98, respectively.

**Conclusion:** Machine learning techniques are increasingly adopted in stroke research, facilitated by global collaborations and advancements in computational science. The study's findings highlight the need for effective predictive models in Malaysia, with SVM showing superior performance in mortality prediction. MIST, as a validated online tool, offers significant potential for enhancing stroke care and public health through accurate mortality risk estimation.

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## VALIDATION AND EFFECTIVENESS OF A NEW SCREENING TOOL FOR PULMONARY TB DETECTION AMONG DIABETIC PATIENTS IN KELANTAN

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**Introduction:** Tuberculosis (TB) is a dangerous infectious disease worldwide. Diabetes mellitus (DM) increases the risk of infection up to four times compared to non-DM patients. With the increase in DM patients, the rate of TB infection is increasing worldwide. Until now, there is no specific TB screening tool for DM patients causing the lack of Pulmonary TB detection among DM patients.

**Objectives:** To determine the factors that contribute to Pulmonary TB disease among DM patients, formulate a TB screening scoring tool and confirm the effectiveness of the Tuberculosis Diabetes Mellitus Predictive Tool (TBDM-PT) in Kelantan.

**Material and Methods:** This study consists of three phases. The case-control study for Phase 1 involved 270 DM patients either suffering from TB ( $n = 90$ ) and non-TB patients ( $n = 180$ ). DM disease status, age 18 years and above and in the health clinic appointment were included in the analysis. Patient data was taken from the DM medical record, TBIS 10-1A form and National Diabetes Registry (NDR) website. Simple and multiple logistic regression was used to analyse the data. During Phase 2, the risk score was formulated based on multiple logistic regression and the area under the curve (AUC) methods. The content validation study involved nine experts in TB management. The values of the factor content validation index (F-CVI) and the average index to the content validation index at the scale level (S-CVI/Ave) were obtained. 20 health workers in health clinics were selected for face validation studies and face validation index (FVI) values were obtained. A pilot study involving 34 DM patients who had undergone TB screening at a health clinic in the Kota Bharu district three months prior, was conducted to determine the diagnostic performance for TBDM-PT such as accuracy, sensitivity, specificity, positive predictive value (PPV), and negative predictive value (NPV). In a quasi-experimental study for phase 3, Kota Bharu was selected as the intervention group, using TBDM-PT as a screening tool while Pasir Mas was the control group using existing screening methods. The patient was followed up for four months until the patient completed the Pulmonary TB diagnosis test as the primary outcome while the secondary outcome was the latent TB infection (LTBI). Incidence rates and risk ratios (RR) were used in comparative analysis to demonstrate the effectiveness of screening tools.

**Result:** The majority of patients were female (56.7%) and aged 60 years and above (60.7%). Seven factors (items) were identified to be closely related by statistical analysis to the risk of TB disease; male (Adj OR: (95% CI); 2.78 (1.17–6.63)), Body mass index (BMI)  $< 23 \text{ kg/m}^2$  (Adj OR: (95% CI); 7.22 (2.74–19.04)), duration of DM  $\leq 10$  years (Adj OR: (95% CI); 2.90 (1.13–7.39)), no BCG scar (Adj OR: (95% CI); 19.76 (2.98–130.9)), HbA1c level in 6 months  $\geq 8\%$  (Adj OR: (95% CI); 19.76 8.31 (3.28–21.05)), history of cough over two weeks (Adj OR: (95% CI); 31.08 (11.64–82.98)) and history of fever over two weeks (Adj OR: (95% CI); 6.25 (1.15–33.99)). TB contact history was found to be clinically closely related to the risk of TB disease through consultation with a TB specialist and was included as a screening item as a high-risk in TBDM-PT. The F-CVI and S-CVI/Ave values reached the accepted adequate screening tool validation level. The pilot study showed the accuracy was 58.8% with a sensitivity of 83%, specificity of 54%, positive predictive value (PPV) 28% and negative predictive value (NPV) 94%. A total of 227 DM patients underwent an experimental study, the risk ratio (RR) for the detection of TB disease was 3.29; 95% CI (1.12,



9.69), while detection of latent TB (LTBI) involving 223 DM patients found the risk ratio (RR) was 3.67; 95% CI (1.01, 12.76).

**Conclusion:** TBDM-PT is a newly developed and validated Pulmonary TB risk scoring tool. It effectively increases the detection rate three- to fourfold of Pulmonary TB disease and latent TB infection in the DM patient population. The recommendation is that this study needs to be improved with cost-effective studies before being used in health clinics.

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### **MENTAL HEALTH HELP-SEEKING INTENTION AMONG HEALTH WORKFORCE IN PAHANG: VALIDATION OF MBACE, BARRIERS, ASSOCIATED FACTORS, AND THE DEVELOPMENT OF PSYHELP POCKET GUIDE**

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**Introduction:** The health workforce's mental well-being is crucial for healthcare systems' sustainability. While it is recognised that the health workforce are exposed to high-stress and demanding situations due to the nature of their roles, some of them do not seek professional help when facing mental health challenges. Although the importance of ensuring that these individuals receive adequate mental health support is evident, numerous factors influence their decisions in seeking professional help. This intricate interplay requires a comprehensive examination, not just to inform effective strategies and interventions but also to foster a deeper understanding of the underlying complexities.

**Objectives:** The primary aims were to: (1) translate, adapt, and validate the Barriers to Access to Care Evaluation (BACE-3) questionnaire for the Malay-speaking population, (2) determine the mental health help-seeking intention score, barriers, and associated factors among the health workforce in Pahang, and (3) develop the PsyHELP pocket guide to encourage the health workforce to seek help from mental health professionals.

**Materials and Method:** The research was conducted in three phases. Phase 1 involved a detailed process of translating and adapting the BACE-3 questionnaire into the Malay version (MBACE). This version was then validated using Confirmatory Factor Analysis (CFA) in a cross-sectional study with 188 participants from diverse health workforce categories. The second phase employed a cross-sectional study design, utilising a set of self-administered questionnaires with 470 participants to gauge mental

health help-seeking intentions, perceived barriers, and their associated factors. In the third phase, the PsyHELP pocket guide was developed, grounded in the Health Belief Model. This guide serves as an educational tool tailored specifically for the health workforce, aimed at bolstering mental health help-seeking behaviours.

**Results:** The 28-item MBACE questionnaire was proven as a reliable and valid tool for the Malay-speaking health workforce, with Cronbach's alpha values between 0.92 and 0.94. In phase 2, the mean mental health help-seeking intention score was noted at 4.9 (SD = 1.2). Significant factors associated with this intention were 'perceived need for help' ( $B = 0.532, p < 0.001$ ) and 'perceived stigma barriers' ( $B = -0.588, p < 0.001$ ). In the final phase, the PsyHELP pocket guide was introduced, incorporating insights from the earlier phases and presenting a practical resource for the health workforce. This guide integrates comprehensive mental health concepts and strategies tailored to the health workforce, highlights the importance of professional help, aims to mitigate stigma, and offers actionable steps towards achieving mental well-being.

**Conclusion:** This comprehensive study underscores the complexities of mental health help-seeking behaviours among the health workforce in Pahang. It gives more insights into the mental health help-seeking intention score, as well as the barriers and associated factors within the Malaysian health workforce, highlighting the roles of perceived need for help and perceived stigma-related barriers that are significantly associated with professional mental health help-seeking intention. The validated MBACE questionnaire offers an effective tool to assess barriers, while the PsyHELP pocket guide emerges as a beacon for the health workforce to navigate their mental well-being. While PsyHELP looks like a promising intervention, its full potential and impact require further validation and research.

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### **DEVELOPMENT, VALIDATION OF COMPETENCY QUESTIONNAIRE, ANALYSIS OF ITS PREDICTORS AND MEDIATORS FOR THE ADOPTION OF HEALTH INFORMATION SYSTEM AMONGST NURSES IN HOSPITAL UNIVERSITI SAINS MALAYSIA**

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**Introduction:** This study builds upon the importance of robust health systems in the wake of a pandemic and the need for increased organisational readiness for change, particularly in the Malaysian healthcare sector. The effectiveness and suitability of instruments employed to gauge organisational readiness have been the subject of

considerable discussion and contention. Despite efforts to assess organisational readiness, over 70% of organisational change management initiatives fail to achieve their intended goals because of employee resistance and insufficient support from the management. This study focuses on the competency component of organisational readiness and its significance in facilitating digital health adoption. Digital health adoption failure has been widely documented in developed and developing economies. This study examined staff competencies, the predictors and mediators that influence employees' competencies necessary for health information systems.

**Objectives:** The first objective was to develop and validate a competency questionnaire that forms a component of organisational readiness for health information system adoption among nurses in Hospital University Sains Malaysia (USM) in Kelantan, Malaysia. Followed by which the second objective determined the current competency level utilising the developed and validated questionnaire. The third objective was to identify the predictors while the final objective was to identify the mediating factors associated with the current competencies amongst nurses.

**Methods:** After generating the items, a cross-sectional study was conducted with 180 nurses, and an exploratory factor analysis was conducted to reduce the number of items and identify the latent constructs, followed by the recruitment of 305 nurses for confirmatory factor analysis (CFA) and evaluation of construct validity. The study continued with the recruitment of 420 nurses from Hospital USM to assess the current staff competency for health information system adoption. Linear regression was conducted to identify the potential predictors that influenced competencies. Two mediation models were analysed to identify the mediators that influenced nurses' competencies in the adoption of health information systems.

**Results:** The final model for competency comprised of 18 items, which demonstrated a good model fit, as suggested by the CFA. The questionnaire displayed excellent convergent and discriminant validity, with all constructs having a correlation coefficient greater than 0.7 for domains with three or more items. The mean values for the Individual domains of Knowledge, Skill, and Attitude are 16.8, 11.0, and 31.0 respectively, with corresponding standard deviations of 3.04, 2.06, and 5.64. Similarly, the mean values for the Team domains of Knowledge, Skill, and Attitude are 15.6, 9.6, and 8.5 respectively, with corresponding standard deviations of 3.01, 2.08, and 2.44. The results for the Individual, Team, and Staff competencies were found to have mean scores of 58.6, 33.8, and 92.4 respectively, with corresponding standard deviations of 9.50, 6.21, and 13.9. In the regression analysis, no predictors were found to explain current staff competency. However, mediation analysis revealed that positional grade served as a mediating factor in the relationship between age and years of experience, mediating the effects of the two variables on staff, individual, and team competencies through competitive mediation classified under partial mediation.

**Conclusion:** The competency questionnaire demonstrated exceptional psychometric properties with adequate validity and reliability and is thus suitable for use in any study pertaining to the adoption of health information systems among nurses. Additionally, the study identified grade as a potential mediator that exhibits competitive mediation effects through age and years of experience,

respectively, to influence competencies related to the adoption of health information systems.

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## DEVELOPMENT AND VALIDATION OF KNOWLEDGE AND ATTITUDE QUESTIONNAIRE ON INTELLECTUALLY DISABLED ADOLESCENTS' HEALTH ISSUES AND ACCESSIBILITY TO PRIMARY HEALTHCARE SERVICES AMONG PRIMARY HEALTHCARE PROVIDERS

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**Introduction:** Adolescents who have intellectual disabilities face distinct health challenges that necessitate specialised care and understanding. Accessing primary healthcare services poses further challenges for this population.

**Objectives:** The objectives of this study were to explore intellectually disabled adolescents' health issues and their accessibility to primary healthcare services and subsequently develop a new questionnaire to assess primary healthcare providers' knowledge and attitudes regarding those concerns.

**Materials and Methods:** The study was conducted in two phases using a mixed-method approach. The first phase involved a questionnaire development based on an extensive literature review, in-depth interviews, content validation, face validation, and pretesting. In-depth interviews were conducted among 26 respondents including 12 caregivers, 10 primary healthcare providers who had experience in managing intellectually disabled adolescents, and four health and medical experts in the management of intellectual disabilities. They were selected using purposive sampling method. Data were analysed using thematic analysis. The qualitative study findings informed item generation. The content validation was performed among seven experts and face validation was conducted among 10 primary healthcare providers in Kelantan. The second phase involved item response theory (IRT), exploratory factor analysis (EFA) and confirmatory factor analysis (CFA) to measure the questionnaire's internal structure validity and reliability. A cross-sectional study was conducted among 444 primary healthcare providers to assess IRT, EFA and CFA. A multistage sampling was used to select the healthcare providers from 20 government primary health clinics in Kelantan.

**Results:** The qualitative findings identified intellectually disabled adolescents' health issues such as medical conditions, mental health conditions, developmental

disabilities, high- risk behaviours, nutrition-related problems, as well as sexual and reproductive health issues. The findings also identified their challenges in accessing primary healthcare services according to Levesque's model namely, approachability, acceptability, availability, affordability and appropriateness. The findings from qualitative study and literature reviews were integrated into the development of new knowledge and attitude questionnaire. An initial questionnaire was developed with 59 knowledge items and 61 attitude items within nine domains. Following the content validation, face validation, IRT for knowledge section and EFA as well as CFA for attitude section, the final questionnaire has resulted in 14 general information items, 38 knowledge items, and 28 attitude items within the same nine domains.

**Conclusion:** A new Malay-validated questionnaire demonstrated strong reliability and valid psychometrics for assessing primary healthcare providers' knowledge on health issues of intellectually disabled adolescents and their attitudes towards these adolescents' accessibility to primary healthcare services.

*Supervisor:*

*Associate Professor Dr. Azriani Ab Rahman*

*Co-supervisors:*

*Dr. Surianti Sukeri*

*Dr. Anis Kausar Ghazali*

*Dr. Mohd Zulkifli Abdul Rahim*

## QUESTIONNAIRE DEVELOPMENT AND DETERMINATION OF FACTORS ASSOCIATED WITH KNOWLEDGE, ATTITUDE AND PRACTICE ON PROVISION OF LONG-ACTING REVERSIBLE CONTRACEPTION AMONG PRIMARY HEALTHCARE WORKERS IN KELANTAN

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**Background:** Long-acting reversible contraception (LARC) is an important strategy in preventing unintended pregnancies, but its utilisation in Malaysia remains low. Healthcare workers (HCWs) can significantly influence LARC uptake, thus assessing their knowledge, attitude, and practice (KAP) on LARC provision is important.

**Objective:** The aim was to assess the knowledge, attitude and practice on the provision of LARC and their associated factors among primary HCWs in Kelantan using a newly developed questionnaire.

**Methodology:** The study was conducted from October 2022 to September 2023, involving HCWs in government health clinics in Kelantan. It is comprised of two phases. Phase 1 focused on developing and validating a new questionnaire. The questionnaire was developed through a literature review, expert consultations and discussions with HCWs. Then, the questionnaire was validated using content validity, cognitive interviews and psychometric evaluation of internal structure.

The knowledge section underwent a two-parameter logistic item response theory (2-PL IRT) analysis. Exploratory factor analysis (EFA) and confirmatory factor analysis (CFA) were conducted for the attitude and practice sections. This psychometric validation involved 444 randomly selected HCWs. Subsequently, phase 2 involved a cross-sectional study assessing KAP and associated factors among 190 randomly selected HCWs from four districts in Kelantan. The newly validated self-administered questionnaire was utilised. Total scores were transformed into percentage scores. The data was then subjected to descriptive analysis and linear regression for comprehensive evaluation. The dependent variables were the KAP scores.

**Results:** The new questionnaire, named 'KAPP-LARC', comprised 39 final items across three sections: 15 in knowledge, 13 in attitude and 11 in practice. The knowledge section displayed acceptable difficulty and discrimination values. The final model for the attitude and practice section exhibited satisfactory model fitness, with all factors having acceptable composite reliability, indicated by Raykov's rho values greater than 0.60. The total mean percentage scores for knowledge, attitude and practice were 69.1%, 48.1% and 64.1%, respectively. Notably, knowledge regarding LARC provision was positively associated with being a doctor (adjusted  $b = 8.40$ ; 95% CI: 3.76, 13.05;  $p < 0.001$ ), receiving formal LARC training (adjusted  $b = 7.47$ ; 95% CI: 2.81, 12.12;  $p = 0.002$ ) and awareness of LARC insertion services in healthcare facilities (adjusted  $b = 8.92$ ; 95% CI: 0.82, 17.02;  $p = 0.031$ ). Moreover, HCWs with more years of experience in Maternal and Child Health exhibited more positive attitudes (adjusted  $b = 0.36$ ; 95% CI: 0.23, 0.50;  $p < 0.001$ ) and practices (adjusted  $b = 0.74$ ; 95% CI: 0.43, 1.04;  $p < 0.001$ ) towards LARC provision.

**Conclusion:** The questionnaire exhibited satisfactory psychometric properties and reliability, making it a suitable instrument for assessing KAP regarding LARC provision among HCWs. Overall, the scores for knowledge and practice were relatively higher than the scores for attitude. Focusing on training, especially on nurses, awareness of service and Maternal and Child Health experience could contribute to the improvement of LARC provision.

*Supervisor:*

*Associate Professor Dr. Tengku Alina Tengku Ismail*

*Co-supervisor:*

*Dr. Suhaily Mohd Hairon*

## THE EFFECTIVENESS OF THE TRIM AND FIT PROGRAMME IN BODYWEIGHT MANAGEMENT AMONG HEALTHCARE PROVIDERS IN TERENGGANU

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**Introduction:** Obesity among healthcare providers (HCPs) is a significant concern, impacting both their well-being and patient care quality.

**Objectives:** This study aims to assess body image perception, the effectiveness of the Trim and Fit Programme, and factors associated with successful weight reduction among overweight and obese HCPs in Terengganu.

**Materials and Methods:** This study started with a cross-sectional study that evaluates body image perception scores and predictors among overweight and obese HCPs. This was followed by a cluster randomised controlled trial to assess the effectiveness of the Trim and Fit Programme's impact on weight, body fat percentage, and waist circumference and a cohort study to determine the factors associated with successful weight reduction. The study spanned January to October 2023, involving 201 HCPs with BMI  $\geq 25$  kg/m<sup>2</sup>. Participants were selected using a multistage random sampling, with 100 in the intervention group and 101 in the control group. The intervention group underwent a six-month Trim and Fit Programme emphasising nutritional modifications, physical activities, recreational engagement, and motivation. The control group received educational booklets on workplace stress. Data was analysed using multiple linear regression, repeated-measures ANCOVA, and multiple logistic regression ( $p < 0.05$ ).

**Results:** The mean (SD) scores of body image perception for negative affect, attractiveness, physical functional awareness, and height dissatisfaction are 27.2 (7.78), 18.5 (5.19), 15.7 (3.47), and 8.6 (3.82), respectively. Age and working hours increase with body image satisfaction, while higher BMI decreases with satisfaction. Nursing professionals report increased height dissatisfaction. Higher incomes correlate with better self-evaluation in looks, health, and fitness, while increased education correlates with lower scores. Marriage impacts self-esteem in attractiveness, health, and fitness but increases height satisfaction. The Trim and Fit Programme significantly improves body weight, body fat percentage, and waist circumference. Factors associated with successful weight reduction include income, total programme attendance, and frequency of calorie intake recording. Body image perception is predicted by sociodemographic and occupational characteristics, but it doesn't significantly contribute to weight reduction success.

**Conclusion:** In conclusion, the body image perception among HCPs in Terengganu highlights the significance of tailored interventions to enhance their self-perception. While the Trim and Fit Programme has proven successful in improving key health outcomes, the high engagement with the programme, particularly through attendance and calorie tracking, is essential for its effectiveness. As a result, resources can now be redirected towards other priorities, recognising that the programme's existing structure effectively achieves its objectives.

*Supervisor:*

Associate Professor Dr. Mohd Nazri bin Shafei

*Co-supervisors:*

Associate Professor Mohd Ismail Ibrahim

Dr. Wan Nor Arifin bin Wan Mansor

## DEVELOPMENT AND EFFECTIVENESS OF EDUCATIONAL MODULE ON PRE-PREGNANCY CARE AMONG WOMEN OF REPRODUCTIVE AGE WITH DIABETES

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bin Tengku Md Fauzi

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**Introduction:** Diabetes Mellitus (DM) stands as one of the major global health challenges of the twenty-first century. When DM is not well-managed, marked by maternal hyperglycaemia before and during the early stages of pregnancy, it significantly increases the risk of severe complications for both the mother and the developing fetus. Pre-Pregnancy Care (PPC) is particularly crucial for mothers with diabetes, as it provides substantial benefits to both the mother and the developing fetus.

**Objective:** To develop and assess the effectiveness of the Educational Module on Pre-Pregnancy Care Among women of reproductive age with diabetes in Terengganu.

**Materials and Methods:** This study was structured in two primary phases: The first phase involved conducting a needs assessment, developing the educational module, and validating it. The second phase was a quasi-experimental study aimed at evaluating the module's effectiveness. The module's development followed the ADDIE model and included five stages: 1) Needs Assessment (A) 2) Consulting Experts for Module Design (D) 3) Post- Development Validation of the Educational Module for Pre-Pregnancy Care in women of reproductive age with diabetes (D), and 4) Implementing PPC Health Education. The quasi-experimental phase involved 90 diabetic women of reproductive age, with 45 in the intervention group from Dungun and 45 in the control group from Kuala Nerus, selected via simple random sampling. The intervention group utilised the newly developed module (I). The effectiveness of the module is determined through data analysis, encompassing improvements in knowledge and attitudes regarding PPC using Repeated Measures Analysis of Variance (RM-ANOVA) (E).

**Results:** Focus Group Discussions (FGDs) was employed to assess needs and found four main themes: knowledge-related needs, attitude-related needs, health service-related needs, and perception-related needs. The module, divided into five units, covers the impact of diabetes on mothers and babies, the importance of PPC for diabetic mothers, PPC components, benefits of contraception, and maintaining controlled diabetes for the safety of both mother and baby. Experts assessed its content validity (S-CVI) as 1.0 and face validity as 0.99. There were significant changes in knowledge scores over time ( $F(1,88) = 76.87, p < 0.001$ ), with a notable difference between the intervention and control groups in mean knowledge scores ( $F(1,88) = 5.71, p < 0.019$ ) and a significant interaction effect ( $F(1,88) = 210.32, p < 0.001$ ). Attitude scores also showed significant overall changes within groups over time ( $F(1,88) = 71.31, p < 0.001$ ), with a significant mean score difference between groups regardless of time ( $F(1,88) = 67.47, p < 0.001$ ) and a notable group-time interaction ( $F(1,88) = 127.81, p = 0.042$ ).



**Conclusion:** The study in Terengganu identified a significant need for a Pre-Pregnancy Care (PPC) educational module tailored for diabetic women of reproductive age, motivated by their desire for a healthy pregnancy. The developed module, validated for both reliability and relevance, effectively improved knowledge and attitudes towards PPC among the intervention group, as demonstrated by the quasi-experimental study's results.

*Supervisor:*

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*Associate Professor Dr. Mohd Ismail Ibrahim*

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## CONFIRMATORY FACTOR ANALYSIS OF THE MALAYSIA MEDICATION ADHERENCE ASSESSMENT TOOL (MYMAAT) AMONG PATIENTS WITH CHRONIC MEDICATIONS

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**Introduction:** Medication non-adherence is a burden of healthcare costs because resources are wasted and underutilised. Knowing a patient belongs to which category of adherence makes it easier to devise a treatment plan to reach realistic goals related to their health outcome.

**Objectives:** The MyMAAT was developed using exploratory factor analysis and the current study intends to confirm the measurement model, dimensionality and ensure the factor structure by confirmatory factor analysis (CFA).

**Material and Methods:** A cross-sectional study was conducted using a self-report questionnaire at six health facilities in the Federal Territories Kuala Lumpur and Putrajaya Health Department between May to November 2023. Participants with age  $\geq 18$  years old, prescribed with one or more chronic medications for at least six months and understand English or Malay language were selected using quota sampling. There were two constructs in the MyMAAT, namely the Specific Medication-Taking Behaviour (Factor 1) with eight items and the Social-Cognitive Theory of Self-Efficacy and Social Support (Factor 2) with four items.

**Results:** There were 470 participants which comprised of Malay (62.7%), Chinese (24.0%) dan Indian (12.2%). Most participants had five drugs or less (81.3%). The final model for the Malay version of the MyMAAT retained the two constructs and 12 items with good fit: CFI = 0.978, TLI = 0.973, RMSEA = 0.036 (90% CI 0.001, 0.067) and with good composite reliability CR = 0.790 for Factor 1 and CR = 0.787 for Factor 2. The AVE for Factor 1 was 0.664 and for Factor 2 was 0.491. There was a strong correlation ( $\rho = 0.507$ ,  $p < 0.001$ ) between the Malay version of the MyMAAT with the Malay version of the MMAS-8 by adherence category from the data of 191 participants. The final measurement model of the English version did not achieve the minimum level of good fit to the data: CFI = 0.933, TLI = 0.917, RMSEA = 0.073 (90% CI 0.052, 0.094) but had good composite

reliability CR = 0.802 for Factor 1 and CR = 0.852 for Factor 2. The AVE was 0.630 for Factor 1 and 0.392 for Factor 2. Fifty-two participants completed the test-retest after five to ten days from the first administration. The Malay version had moderate to excellent reliability based on ICC = 0.932 (95% CI: 0.661, 0.986) for Factor 1 whereas Factor 2 had poor to excellent reliability based on ICC = 0.956 (95% CI: 0.325, 0.997) by using the Two-Way Mixed Model and Consistency type. The English version had moderate to excellent reliability based on ICC = 0.911 (95% CI: 0.554, 0.982) for Factor 1 whereas Factor 2 had poor to excellent reliability based on ICC = 0.941 (95% CI: 0.092, 0.996).

**Conclusion:** It can be concluded that the Malay version of the MyMAAT is valid and reliable in measuring medication adherence among participants with chronic medication(s), but the English version needs to be improved and then re-tested.

*Supervisor:*

*Associate Professor Dr. Sarimah binti Abdullah*

*Co-supervisor:*

*Professor Dr. Norsa'adah binti Bachok*

## FACTORS ASSOCIATED WITH HIV INFECTION AMONG SEXUALLY TRANSMITTED INFECTION CLINIC ATTENDEES IN KELANTAN, 2016–2022

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**Background:** The changing landscape of Human immunodeficiency virus (HIV) infection shifting from drug abuse to sexual contact as the primary of HIV transmission brought about new challenges in combating the spread of HIV worldwide and Malaysia is no exception. In response, Malaysia initiated state-based sexual health clinics in 2016 to reach out to those at risk, which was found to be effective in delivering HIV services that include early detection and prevention of HIV transmission among high-risk individuals as well as providing treatment for HIV-positive patients. For Kelantan state, the Sexually Transmitted Infection (STI) clinics as they are known, was first established in Klinik Kesihatan Bandar Kota Bharu in 2016 expanded to include all the 10 districts three years later.

**Objectives:** This study aimed to determine the proportion of HIV positivity and factors influencing HIV infection among patients with STI who attended STI clinics in Kelantan from 2016 to 2022.

**Material and Methods:** This study utilised a cross-sectional design whereby data were collected by extracting information from the records of patients who visited STI clinics in Kota Bharu, Pasir Puteh and Tumpat from the year 2016 to 2022. Logistic regression analyses and model were performed to identify factors related to HIV positivity among patients who attended STI clinics in Kelantan.

**Results:** Out of 247 patients who attended the STI clinics involved in the study, 228 cases (93.3%) had

documented HIV test results, of which 75 cases (32.9%) were HIV-positive. Significant factors associated with HIV infection among STI patients included age  $\geq 30$  years (AOR: 1.857, 95% CI 1.010, 3.416,  $p < 0.046$ ), male gender (AOR: 5.807, 95% CI 1.324, 25.466,  $p = 0.020$ ), divorced status (AOR: 9.407, 95% CI 1.074, 82.398,  $p = 0.043$ ), working in private sector (AOR: 3.844, 95% CI 1.744, 8.473,  $p = 0.001$ ), and had syphilis (AOR: 6.612, 95% CI: 3.567, 12.259,  $p < 0.001$ ).

**Conclusion:** About one third of the respondents were HIV-positive and based on the final model, were associated with three factors—male gender, divorced and confirm STI diagnosis of syphilis. Strategies needed to prevent HIV positivity among the STI clinic attendees should address and focus on these 3 factors first.

*Supervisor:*

*Professor Dr. Mohamed Rusli Abdullah*

*Co-supervisor:*

*Associate Professor Dr. Wan Mohd Zahiruddin*

## TRANSLATION, CULTURAL ADAPTATION AND VALIDATION OF PERCEIVED NUTRITION ENVIRONMENT MEASURES SURVEY (NEMS-P) AND ITS RELATIONSHIP WITH THE GLYCAEMIC VALUES (HBA1C) AMONG DIABETIC PATIENTS IN KUALA TERENGGANU DISTRICT

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**Introduction:** The perceptions of diabetic patients on their food environment influence their dietary choices and may impact glycaemic control. The Perceived Nutrition Environment Measures Surveys (NEMS-P) questionnaire is a valid and reliable measure to access perceived food environment. To date, there is no available instrument to measure the perceived food environment in Malaysia and its association with the level of glycaemic control among diabetic patients.

**Objectives:** This study aimed to translate, culturally adapt and validate Malay version of NEMS-P, and to study the relationship between the perceived food environments and the glycaemic values among diabetic patients attending health clinics in Kuala Terengganu district.

**Methodology:** Phase 1 study involved translation, cultural adaptation and validation of the NEMS-P within Malay context. Confirmatory factor analysis (CFA) was conducted involving 200 diabetic patients in Kuala Terengganu and were randomly selected by multi-staged sampling and interviewed using the NEMS-P (Malay). Phase 2 was a cross-sectional study involving 304 diabetic patients and were selected from all three health clinics in Kuala Terengganu by applying the stratified sampling proportional to size method and utilising the validated NEMS-P (Malay). Linear Regression was used for the analysis.

**Results:** The average Content Validity Ratio (CVR) was 0.90, the Scale Content Validity Index (S-CVI) for relevance was 0.81 and the S-CVI for clarity was 0.96, both scale face validity index (S-FVI) for clarity and comprehension were 0.97 and all were acceptable. The constructs which were included in CFA were perceived store consumer environment (PSCE), perceived restaurant consumer environment (PRCE) and perceived home food environment (PHFE) but perceived community nutrition environment (PCNE) was excluded as it did not require construct analysis. The factor loading ranged from 0.3 to 0.9 and the model had acceptable fit. The construct reliability (CR) values ranged from 0.614 to 0.778, the average variance extracted (AVE) 0.171 to 0.469. One inter-factor correlation value was higher than the square root of average variance extracted (AVE). For phase 2, 68.8% of respondents were females with the mean age of 58.77 (SD 10.57). Most respondents entered secondary school (57.9%), married individuals (69.7%) and overweight or obese (72.0%). The proportion of smokers was low (7.6%). All four perceived food environment constructs were included for scoring. The mean score for the PCNE was 9.70 (SD 2.71), PSCE was 37.60 (SD 3.82), PRCE was 4.28 (SD 3.11) and PHFE was 19.53 (SD 4.95). The mean duration (years) of diabetes was 6.71 (SD 5.78) with the mean HbA1c (%) of 8.09 (SD 2.14). There was no significant association between perceived food environments and glycaemic values. Instead, there were other statistically significant factors; age [ $-0.05$  (95% CI:  $-0.075$ ,  $-0.025$   $p$ -value: 0.001)], married [ $1.42$  (95% CI:  $0.407$ ,  $2.429$   $p$ -value: 0.006)], divorced/separated [ $1.20$  (95% CI:  $0.063$ ,  $2.331$   $p$ -value: 0.039)], smoking [ $1.25$  (95% CI:  $0.377$ ,  $2.128$   $p$ -value: 0.005)] and duration of diabetes [ $0.10$  (95% CI:  $0.052$ ,  $0.137$   $p$ -value: 0.001)].

**Conclusion:** Malay version of NEMS-P questionnaire is a valid and reliable tool to measure perceived food environment in Kuala Terengganu. There was no statistically significant relationship between perceived food environments and HbA1c values, indicating the need for future research with a more heterogeneous and diverse population.

*Supervisor:*

*Associate Professor Dr. Rohana binti Abdul Jalil*

*Co-supervisor:*

*Associate Professor Dr. Najib Majdi bin Yaacob*

## RISK PERCEPTION ON NEEDLESTICK INJURY AND EFFECTIVENESS OF THE NEEDLESTICK PREVENTION MODULE AMONG HOUSE OFFICERS IN KELANTAN

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**Introduction:** House officers (HOs) face a significant occupational threat from needlestick injuries (NSIs), posing potential risks of exposure to bloodborne pathogens. Understanding the factors influencing NSI risk perception and developing effective training modules are essential for

implementing robust preventive measures. This research explores factors influencing NSI risk perception among HOs and evaluates the effectiveness of the Needlestick Injury Prevention Module (N-SIP) in enhancing NSI-related knowledge and risk perception.

**Objectives:** The objectives of this study is to determine the mean perception score on risk of NSI, factors associated with mean the perception score, module development and validation, and effectiveness of the newly developed module.

**Materials and Methods:** This study utilised a cross-sectional design involving 176 HOs, who completed a self-administered questionnaire. Linear regression identified associated factors of NSI risk perception scores. Additionally, the N-SIP module was developed using the ADDIE model and underwent content validation by experts and face validation by HOs. A non-randomised interventional design assigned HOs to either the intervention group receiving the N-SIP module or a control group, with NSI risk perception scores assessed at baseline, three weeks, and six weeks post-intervention using validated measures. Statistical analysis, including repeated-measures ANOVA, evaluated changes in perception scores.

**Results:** The study found an overall mean risk perception score of 47.63, indicating a positive score among HOs. The cross-sectional study revealed that gender ( $b = 1.96$ ;  $p = 0.002$ ), work experience ( $b = 2.93$ ;  $p < 0.001$ ), attending health education on NSI ( $b = 4.42$ ;  $p < 0.001$ ), and history of NSI ( $b = 4.96$ ;  $p < 0.001$ ) significantly influenced NSI risk perception. The N-SIP module demonstrated high content validity and positive face validity among HOs. The interventional study showed a significant improvement in NSI risk perception scores among the intervention group compared to the control group, with statistically significant increases observed from baseline to three weeks and six weeks post-intervention. No significant changes were observed in the control group over the same period.

**Conclusion:** The study identified key factors influencing HOs' perception of NSI risk, with an overall mean risk perception score of 47.63 indicating a generally positive perception among HOs. The effectiveness of the N-SIP module in enhancing NSI risk perception was demonstrated, with significant improvements observed in the intervention group. Targeted training programmes, such as the N-SIP, significantly impact risk perception and promote occupational safety among HOs. These findings underscore the importance of continued efforts to implement and evaluate tailored educational interventions to mitigate NSI risks and improve safety practices in healthcare settings.

*Supervisor:*

*Associate Professor Dr. Mohd Nazri bin Shafei*

*Co-supervisors:*

*Associate Professor Dr. Mohd Ismail bin Ibrahim*

*Associate Professor Dr. Najib Majdi bin Yaacob*

## **TRANSLATION AND VALIDATION OF ADULT CARER QUALITY OF LIFE (AC-QOL) QUESTIONNAIRE AND MEDIATION ANALYSIS OF DEPRESSION, ANXIETY AND STRESS ON QUALITY OF LIFE OF INFORMAL CAREGIVERS OF STROKE SURVIVORS IN KELANTAN**

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**Introduction:** As the global population ages and the prevalence of chronic illnesses rises, the demand for caregivers has grown substantially, prompting increased interest in understanding caregivers' quality of life (QoL). Caring for stroke survivors presents unique challenges and rewards, impacting caregivers' QoL.

**Objectives:** To determine the characteristics of publications on caregivers' QoL through bibliometric analysis, to translate and validate the Malay version of the Adult Carer Quality of Life Questionnaire (AC-QoL), to model relationships between informal caregivers' and stroke survivors' factors with informal caregivers' QoL and to estimate the mediation effects of depression, anxiety, and stress.

**Materials and Methods:** Bibliographic data were extracted from the Scopus database using terms like "caregivers" and "quality of life". The analysis included original articles or reviews in English up to August 2023, utilising the 'bibliometrix' package in RStudio. The second study was a cross-sectional study that translated the AC-QoL into Malay through a ten-step process. Content and face validation were conducted with six experts and ten subjects, respectively. Confirmatory factor analysis (CFA) was performed on data from 222 informal caregivers. 60 informal caregivers were subjected for retesting for stability. The third study, another cross-sectional study, analysed data from 250 informal caregivers. Linear regression modelled relationships between stroke survivors' and informal caregivers' factors with informal caregivers' QoL. Hayes's PROCESS macro model 4 for bootstrapping indirect effects was used to estimate the mediation effects of depression, anxiety, and stress.

**Results:** Since 1989, 1859 original research articles and reviews were published, with a 15.52% annual growth rate. The USA led with the most publications (327), citations (9993), and collaboration activity. Key keywords included "depression", "anxiety", "stroke", "dementia", "cancer", and "burden". Clusters for "depression", "anxiety", "cancer", and "family caregivers" dominated current research, while "dementia" and "Alzheimer's disease" are emerging topics. In the second study, content validity indicated rephrasing for two items. Face validity was high for all items. CFA suggested removing four items due to low factor loading, resulting in a model with satisfactory indices: CFI (0.889), TLI (0.877), RMSEA (0.066), and SRMR (0.064). Composite reliability ranged from 0.77 to 0.91. Significant differences were observed in QoL scores among informal caregivers with varying levels of depression, anxiety, and stress. The questionnaire showed good stability (ICC = 0.86). In the

third study, stroke survivors' dependency ( $b = 0.14$ ), informal caregivers' depression ( $b = -0.81$ ), and anxiety ( $b = -0.73$ ) were significantly associated with informal caregivers' QoL. Depression (effect = 0.02) and anxiety (effect = 0.01) partially mediated the relationship between stroke survivors' dependency and informal caregivers' QoL.

**Conclusion:** Informal caregivers' QoL is profoundly influenced by the demands of caregiving, particularly for stroke survivors. The bibliometric analysis highlights the evolving research landscape, while the validation of the AC-QoL provides a reliable tool for assessing informal caregivers' QoL in Malaysia. The mediation analysis underscores the significant role of psychological distress, specifically depression and anxiety, in modulating the impact of stroke survivors' dependency on informal caregivers' QoL. These insights emphasise the necessity for targeted screening and interventions to alleviate informal caregivers' psychological burdens, ultimately enhancing their quality of life.

Supervisor:

Professor Dr. Kamarul Imran Musa

Co-supervisor:

Dr. Wan Nor Arifin

## GLYCAEMIC CONTROL AMONG WOMEN WITH GESTATIONAL DIABETES MELLITUS IN NORTHERN TERENGGANU: A MIXED METHODS STUDY

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**Background:** Gestational diabetes mellitus (GDM) has become a common medical condition in pregnancy and is associated with short- and long-term complications for mothers and offspring. However, information regarding poor glycaemic control is still limited in Malaysia.

**Objectives:** This study aims to determine glycaemic control, self-efficacy, self-care, and physical activity levels, as well as factors associated with poor glycaemic control among women with GDM and to explain its significant factors based on individual experiences of women with GDM.

**Methodology:** An explanatory sequential mixed methods study was conducted among women with GDM who attended health clinics in the Besut and Setiu districts for antenatal care. Stratified sampling proportional to size method was done in quantitative research to obtain 235 samples. Logistic regression was applied to determine associations between sociodemographic and obstetric characteristics, self-efficacy, self-care activity and physical activity with poor glycaemic control. Then, purposive sampling was done in qualitative inquiry to obtain 12 samples among women who were recruited in the quantitative research and had poor glycaemic control. Thematic analysis was applied to identify recurring themes. The data from both quantitative and qualitative inquiry were then integrated to answer research questions.

**Results:** The mean (SD) score for overall self-efficacy was 146.89 (24.02). The mean (SD) score for self-care general diet, specific diet, physical activity, and blood glucose testing was 4.50 (1.34), 4.77 (1.35), 4.46 (1.58), and 0.45 (0.44), respectively. The median (IQR) for overall physical activity was 137.56 (112.23). Dietetic counselling (AOR = 2.99; 95% CI: 1.41, 6.35;  $p$ -value = 0.004) and diet self-efficacy (AOR = 0.75; 95% CI: 0.57, 0.98;  $p$ -value = 0.033) were associated with poor glycaemic control. There were six themes emerged from the interviews, namely: fear and worry, knowledge and motivation, dietary preferences and beliefs, family factors, occupational factors, and availability and affordability. Most of the respondents acknowledged that dietetic counselling sessions offered crucial dietary knowledge and practical integration tips, while also increasing their confidence in managing GDM more effectively. Furthermore, they demonstrated diet self-efficacy by adopting healthy eating habits, driven by personal awareness or their family members.

**Conclusion:** Our findings showed that glycaemic control among women with GDM was influenced not only by internal factors but also external factors.

Supervisor:

Associate Professor Dr. Rohana binti Abdul Jalil

Co-supervisor:

Dr. Surianti binti Sukeri

## DEVELOPMENT AND VALIDATION OF MALARIA KNOWLEDGE QUESTIONNAIRE AND THE LEVEL OF MALARIA KNOWLEDGE AMONG POPULATION IN KUALA KRAI AND GUA MUSANG, KELANTAN

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**Background:** Malaysia has made significant progress in reducing malaria cases, achieving zero local transmission in 2018. However, imported cases continue to pose risks of reintroduction. Assessing local knowledge is vital for targeted education as it empowers communities with the information necessary to take appropriate actions to prevent malaria transmission, thereby reducing the risk of transmission and contributing to the overall goal of malaria elimination.

**Objective:** This study aimed to develop and validate a questionnaire assessing local communities' malaria knowledge and compare this knowledge among residents in low, medium, and high-risk areas in Kelantan, Malaysia.

**Materials and Methods:** The study was conducted from June 2023 to February 2024. It is comprised of two phases. Phase 1 focused on developing a new questionnaire and validating it. A draft of the questionnaire was established from a literature review and expert input via the Nominal Group Technique. Then, the questionnaire was validated using content validity, face validity and construct validity. Content validity was conducted among experts in public health, and face validity among local communities. Construct



validity was analysed using a two-parameter item response theory, involving 300 participants. Subsequently, phase 2 involved a cross-sectional study involving 159 participants assessing the knowledge on malaria among residents in low, medium, and high-risk areas in Kuala Krai and Gua Musang districts, Kelantan. The newly validated self-administered questionnaire from phase 1 was utilised. The data was then subjected to descriptive analysis and two-way ANOVA analysis.

**Result:** The new questionnaire comprised of 53 items across the seven domains. The domains are transmission, risk of malaria infection, vector, symptoms, complications, treatment and management, and prevention measures. The questionnaire demonstrated good content (S-CVI/Ave = 0.99, S-CVI/UA = 0.92) and face validity (S-FVI = 1.0, S-FVI/UA = 0.99). The 2-PL IRT analysis show that the questionnaire has good model fitness and acceptable difficulties and discrimination parameters, with reliability of the domains ranges from 0.62 to 0.83. The ANOVA analysis revealed that residents in high-risk areas had the highest estimated marginal mean knowledge score of 35.0 (95% CI: 32.8, 37.2), followed by those in medium-risk areas, 34.4 (95% CI: 32.2, 36.6), with the lowest scores in low-risk areas, 29.0 (95% CI: 26.8, 37.2). The high and medium-risk area residents had significantly higher knowledge scores than low-risk residents ( $p < 0.001$ ), however there is no significant difference between high-risk area residents and medium-risk residents ( $p = 0.927$ ).

**Conclusion:** The developed questionnaire is reliable for assessing malaria knowledge in the context of the local community in Malaysia. Residents in low-risk areas exhibited a more significant knowledge deficit compared to those in medium- and high-risk areas. Comprehensive community health education, including in low-risk areas, should be continued given the potential risk of malaria transmission.

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## SPATIAL DISTRIBUTION AND MULTILEVEL ANALYSIS OF DETERMINANTS OF MEASLES IN MALAYSIA, 2018–2022

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**Introduction:** Measles remains a significant public health challenge worldwide, including in Malaysia, despite high vaccination rates and comprehensive control strategies. The persistent fluctuations in measles incidence across districts highlight the complexity of controlling this disease, which is influenced by a multitude of demographic, environmental, and healthcare-related factors.

**Objectives:** This study aims to analyse the spatial distribution of measles, explore the determinants of its transmission, and understand the impact of individual and

contextual factors on its incidence in Malaysia from 2018 to 2022.

**Materials and Methods:** This study integrates three distinct analytical approaches using data sourced from the Disease Control Division of the Ministry of Health Malaysia, the e-measles database, and additional demographic and environmental data from the Department of Statistics Malaysia and the Department of Environment Malaysia. Spatial autocorrelation techniques, including Global Moran's I and Local Indicators of Spatial Association (LISA), were used to identify measles hotspots and clustering effects. A negative-binomial mixed-effect model was employed to assess the impact of healthcare access, demographics profile, and environmental factors on measles incidence. Furthermore, multilevel logistic regression analysis examined the relationship between measles infection and both individual-level factors such as age, gender, ethnicity, travel history, nationality status, contact history, travel history and vaccination status and district-level determinants including population density, median household income, urbanisation, number of healthcare facility, vaccination coverage, PM2.5, relative humidity and temperature.

**Results:** The analysis identified significant districts like Bintulu, Marudi, Miri, and Gua Musang with measles incidence rates exceeding 500 per million population in specific years. A general decline in incidence from 2018 to 2021, followed by a slight increase in 2022, was observed. Spatial autocorrelation analysis confirmed the presence of clustering of measles cases in Malaysia with persistent hotspots in certain regions, particularly in Klang Valley. Significant factors influencing measles incidence included median household income (aIRR 1.02, 95% CI: 1.01, 1.03), number of healthcare facilities (aIRR 1.02, 95% CI: 1.01, 1.04) and temperature (aIRR 0.85, 95% CI: 0.74, 0.99). The odds of getting measles are higher among older age (aOR 1.02, 95% CI 1.02, 1.03), indigenous ethnic (aOR 6.80, 95% CI 4.88, 9.48), non-Malaysian (aOR 34.53, 95% CI 8.42, 141.51), those with contact history (aOR 2.36, 95% CI 2.07, 2.69) and those with travel history (aOR 2.30, 95% CI 1.13, 4.70). An increase in one dose of measles vaccine in an individual reduces the risk of measles infection by 24% (aOR 0.76, 95% CI 0.72, 0.79). For contextual factors, urbanisation was significantly associated with measles infection (aOR 1.56, 95% CI 1.16, 2.10) and the more health and rural clinics in a district an individual resides in, the lower the risk of measles infection (aOR 0.98, 95% CI 0.97, 0.99) adjusted for the clustering effect of the district.

**Conclusion:** There is presence of continuous threat of measles transmission in Malaysia that may hinders the achievement of the elimination target. Thus, effective management of the disease require a comprehensive approach that combines detailed epidemiological surveillance, socio-economic interventions, and personalised healthcare strategies.

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## MEN'S HEALTH BEHAVIOURS AMONG PUBLIC SAFETY PERSONNEL IN KELANTAN: A PREDICTION AND MEDIATION ANALYSIS

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**Introduction:** Men's health behaviours are influenced by masculinity norms, often deterring health-promoting actions and help-seeking. These norms exacerbate the health disparities between men and women. Effective health interventions must challenge these traditional masculinity norms to improve health outcomes for men.

**Objectives:** This study involved translating and validating the Malay versions of the Conformity to Masculine Norms Inventory (CMNI-30) and the Health Behaviour Inventory-Short Form (HBI-SF), predicting men's health behaviours, and assessing the mediating role of social support in the relationship between masculinity norms and men's health behaviours among public safety personnel in Kelantan.

**Materials and Methods:** Conducted in two phases from June to December 2023, validated questionnaires first involved 438 male staff at Hospital Universiti Sains Malaysia. In the second phase, involving 257 public safety personnel, the study assessed predictors and social support's mediating role using regression analysis, confirmatory factor analysis (CFA), and structural equation modelling (SEM), conducted using SPSS, R, and Mplus software.

**Results:** Both questionnaires possessed good psychometric properties generally, though some issues were noted. Poor men's health behaviours involved those who never sought treatment at public healthcare facilities, parental influence, and leisure time, while friends/colleagues and transportation support served as protection. Social support fully mediated the relationship between masculinity norms and health behaviours, nullifying the direct negative impact of these norms. The overall effect demonstrated a significant interplay between masculinity norms, social support, and men's health behaviours.

**Conclusion:** Health interventions targeting social support can effectively counteract the negative implications of masculinity norms, thereby promoting better health behaviours among men.

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## THE UNMET NEEDS AMONG WORKING MOTHERS OF CHILDREN WITH EPILEPSY ATTENDING SPECIALIST HOSPITALS IN KELANTAN: A MIXED METHODS STUDY

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**Background:** Working mothers of children with epilepsy (CWE) face a range of unmet needs and challenges that may impact their health and well-being. These unmet needs occur when assistance or support to perform everyday activities is not provided. The unpredictable nature of epilepsy causes severe work-family conflict among these women, potentially resulting in higher levels of unmet needs, which can further exacerbate the difficulties they encounter.

**Objective:** The objectives of this study were to identify the unmet needs among working mothers of CWE, its predictive factors, and the barriers leading to unmet needs.

**Methodology:** This was a mixed-method study involving a combination of quantitative (phase 1) and qualitative methods (phase 2) from February till August 2023. Phase 1 study involved 204 working mothers of CWE registered at the Paediatric Neurology Clinic in Kelantan, while phase 2 involved 15 working mothers from phase 1 who agreed to be interviewed. The validated Malay version of Family Needs Survey questionnaire was used to assess the unmet needs. General linear regression was applied to analyse the relationship between unmet needs scores and study factors. Thematic analysis was used to assess the barrier leading to unmet needs among the mothers.

**Result:** The quantitative study found the highest prevalence of unmet needs was observed in the community services domain (81.6%), followed by the information domain (71.9%), social support domain (53.1%), financial domain (43.2%), and explaining to others domain (28.9%). The lowest unmet need was observed for the family functioning domain (28.4%). Several factors were significantly related to higher unmet needs, including seeking follow-up care at secondary hospitals, having children with comorbidities, working in the government sector, and being employed on a contract basis. On the other hand, factors that reduced unmet needs included belonging to a nuclear family structure and having full-time employment. The findings from the quantitative component informed the design and focus of the subsequent qualitative exploration. The qualitative phase identified three main themes related to the barriers faced by working mothers of CWE. These themes centred on the child; "Uncertainty and endless worrying for my child", the mother; "Me and my career", and the surrounding circumstances; "I don't receive enough support". Mothers expressed constant uncertainty and worry about their child's well-being. They also struggled with balancing their own needs and career aspirations. Additionally, challenges arose from family dynamics, government policies, and societal expectations.

**Conclusion:** This study highlights the significant unmet needs among working mothers of CWE in Kelantan, emphasising the profound impact on their daily lives and well-being. The highest unmet needs were found in

community services and information, suggesting a critical gap in accessible support and resources. Factors such as seeking care at secondary hospitals, children's comorbidities, government sector employment, and contract-based work were associated with higher unmet needs, while nuclear family structure and full-time employment reduced these needs. Qualitative insights revealed persistent worry for their children, struggles in balancing personal needs and careers, and a lack of adequate support from family, government, and society. Addressing these unmet needs requires a multifaceted approach, including improved community services, information dissemination, and supportive policies to alleviate the burdens faced by these mothers.

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### **KNOWLEDGE, ATTITUDE, AND PRACTICE (KAP) QUESTIONNAIRE ON MELIOIDOSIS: DEVELOPMENT AND VALIDATION AND ASSOCIATED FACTORS AMONG FIELD AGRICULTURAL FARMERS IN KELANTAN, MALAYSIA**

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**Introduction:** Melioidosis, caused by the bacterium *Burkholderia pseudomallei*, is a significant public health concern in Malaysia, particularly among field agricultural farmers who face a heightened risk of exposure due to their occupational activities. Despite its importance, there is a lack of validated questionnaires to assess the knowledge, attitude, and practices (KAP) regarding melioidosis and study its associated factors among this high-risk population.

**Objectives:** This study aimed to develop and validate a new questionnaire assessing KAP towards melioidosis among fields agricultural farmers in Kelantan, Malaysia. Additionally, it was aimed to determine the KAP levels and associated factors among them.

**Materials and Methods:** This two-phase study was conducted between May 2023 and March 2024. In Phase 1, a KAP questionnaire was developed and validated through rigorous processes involving literature review, content validation, face validation, item response theory (IRT), exploratory factor analysis (EFA), and confirmatory factor analysis (CFA). The questionnaire was administered to 432 field agricultural farmers in Kelantan (222 for EFA, 210 for CFA). In Phase 2, a cross-sectional study was conducted among 392 farmers to assess their KAP scores and identify associated factors using the validated questionnaire. In the first phase, data were analysed using R software, while in the second phase, the analysis was conducted using SPSS version 26.

**Results:** The proposed melioidosis KAP questionnaire named M-KAP, which consisted of 62 items has demonstrated excellent content validity (S-CVI/Ave: 0.97 for knowledge, 0.96 for attitude, 0.99 for practice) and face validity (S-FVI/Ave: 0.99 for knowledge, 0.95 for attitude, 1.0 for practice). IRT, EFA and CFA confirmed the construct validity and reliability of the questionnaire with analysis revealed an acceptable range of difficulty and discrimination in IRT, reliable internal consistency with Cronbach's alpha values of 0.7 and above in EFA, and satisfactory composite reliability, as indicated by Raykov's rho values exceeding 0.70 in CFA. In phase 2, the total mean percentage for knowledge, attitude and practice were 36.4%, 62.6% and 77.6% respectively. Factors significantly associated with higher knowledge scores were female gender (adjusted  $\beta = 3.84$ ,  $p = 0.013$ ), and individuals with affected close contacts (adjusted  $\beta = 7.20$ ,  $p = 0.008$ ). However, those working with non-paddy crops (adjusted  $\beta = -6.17$ ,  $p < 0.001$ ) associated with lower knowledge of melioidosis. Smoker associated with lower attitude (adjusted  $\beta = -1.69$ ,  $p = 0.008$ ) and non-paddy crop workers (adjusted  $\beta = 1.67$ ,  $p = 0.007$ ) associated high higher attitude score. Higher education level (adjusted  $\beta = -1.56$ ,  $p = 0.011$ ) and having multiple job scopes (adjusted  $\beta = -1.58$ ,  $p < 0.001$ ), were associated with lower practice scores.

**Conclusion:** The newly developed KAP questionnaire on melioidosis is valid and reliable for assessing knowledge, attitude, and practice towards melioidosis among farmers in Kelantan. Significant factors related to KAP towards melioidosis are gender, type of crops, history of melioidosis among close contacts, smoking status, education level, and tasks in the farm.

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### **MODELLING OF KNOWLEDGE AND CONSPIRACY BELIEFS ON CHILDHOOD VACCINE HESITANCY AMONG PARENTS IN KELANTAN USING MALAY VALIDATED QUESTIONNAIRES**

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**Introduction:** Globally, childhood vaccine hesitancy remains a significant public health concern. Knowledge is well-known influence on the parental's vaccination decision. Additionally, in light of COVID-19 pandemic, vaccine conspiracies theories worsen the hesitancy. However, local studies looking on this relationship towards vaccine hesitancy using Malay language validated tools were scarce.

**Objectives:** This study aimed, firstly to translate and validate One-dimensional Knowledge scale (OKS), Vaccine Conspiracy Beliefs scale (VCBS) and Modified Vaccine

Hesitancy scale (MVHS) into Malay language and secondly, to model relationship of demographic variables, knowledge, and conspiracy belief on childhood vaccine hesitancy among parents in Kelantan using structural equation modelling.

**Materials and Methods:** This was a cross-sectional study conducted in two phases. Phase I, involved translation of the OKS, VCBS and MVHS into Malay version, from April 2023 till June 2023. The scales were translated into Malay based on established guidelines. Content and face validity were assessed involving six expert panels and 10 parents respectively. The data was analysed using Microsoft Excel 365. Then, Phase II was continued between July 2023 till March 2024 involving 270 parents with children aged  $\leq 7$  years. Confirmatory Factor Analysis (CFA) was used to ensure the scales used were valid and reliable to measure the study variables, then, structural equation modelling (SEM) was performed to determine the relationship between variables. Test-retest reliability was determined to ensure stability of newly translated scales. Data was analysed using IBM SPSS version 26 and Mplus version 8.

**Results:** Phase 1, the M-OKS, M-VCBS and M-MVHS achieved recommended scores of  $\geq 0.83$  for item indices and scale indices for content and face validity indices. Phase II, the measurement model of M-OKS, consist of unidimensional 10-items demonstrated good model fit (CFI = 0.976, TLI = 0.969, RMSEA (90%CI) = 0.053 (0.030, 0.074), WRMR = 0.877). The 8-item of M-VCBS with correlated items showed good model fit (CFI = 0.977, TLI = 0.967, RMSEA (90% CI) = 0.053 (0.020, 0.082), SRMR = 0.028). The 9-item of M-MVHS consist of two domain “Lack of confidence” and “Risk perception” incorporating correlated items achieved good model fitness (CFI = 0.970, TLI = 0.957, RMSEA (90% CI) = 0.057 (0.031, 0.082), SRMR = 0.031). Composite reliability for M-OKS, M-VCBS and M-MVHS ranged from 0.741 to 0.935 and AVE values of  $\geq 0.5$ , indicating all scales demonstrated good convergent validity. The test-retest reliability, measured by the Intra-class Correlation Coefficient (ICC) ranged from 0.730 to 0.854, indicating good stability for all scales. The final structural model consist of ten hypotheses exhibits good model fit based on the fit indices (CFI = 0.961, TLI = 0.954, RMSEA (90% CI) = 0.040 (0.032, 0.053), SRMR = 0.043). Several indirect relationships were identified between pathways towards vaccine hesitancy.

**Conclusion:** This study provides valid and reliable Malay-language tools to measure knowledge and conspiracy beliefs on childhood vaccine hesitancy among parents in Kelantan. The present study demonstrated the significant relationship of knowledge and conspiracy beliefs on parental vaccination decision, offering valuable insights for public health authorities and policy maker to devise targeted strategies in increasing vaccination uptake.

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## VALIDATION OF THE HEALTH BELIEFS RELATED TO CARDIOVASCULAR DISEASE (HBCVD) SCALE AND FACTORS ASSOCIATED WITH HEALTH- PROMOTING BEHAVIOUR AMONG SINGLE MOTHERS IN KELANTAN

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**Background:** Cardiovascular disease (CVD) is the leading cause of death among women, with single mothers at higher risk due to psychosocial disadvantages. Belief in illness preventability significantly influences CVD risk and health-promoting behaviours (HPB).

**Objective:** The current study aimed to translate and validate the health beliefs related to the cardiovascular disease (HBCVD) scale, determine the mean scores of HPB subscales, and assess the relationships between health beliefs, sociodemographic and comorbidities, and perceived social support with HPB among single mothers in Kelantan.

**Methodology:** The study comprised two phases from May 2023 to April 2024. Phase one involved the translation and validation of the HBCVD scale. The forward and backward translation process was conducted by four translators. The validation process was performed by expert panels and a potential target population to obtain a Content Validity Index (CVI) and Face Validity Index (FVI). Construct validity using confirmatory factor analysis (CFA) was conducted among 275 respondents using a robust maximum likelihood estimator. Meanwhile, the internal consistency reliability was examined based on composite reliability (Raykov's rho). Subsequently, phase two was a cross-sectional study which involved 242 respondents who were randomly selected from four districts in Kelantan. The independent variables included sociodemographic factors, clinical profile, health beliefs related to CVD and perceived social supports. The dependent variable was the total HPB score. The data was then subjected to descriptive analysis and multiple linear regression for comprehensive evaluation of the predictors for HPB.

**Results:** The CVI and FVI were 0.91 and 0.96, respectively. The factor loadings of each item were acceptable ( $> 0.4$ ), and the fit indices from the final model of CFA resulted in a good model fit [SRMR = 0.054, RMSEA = 0.060 (90% CI: 0.050, 0.070, CFI = 0.931, TLI = 0.920)]. The HBCVD-M showed good reliability, and the internal structure fit the model, with composite reliability ranging from 0.745–0.902. The total HPB score obtained by the respondents was 118.03 (19.2). The highest mean (SD) score was noted for spiritual growth, 22.46 (3.70), and for interpersonal relationships, 22.05 (3.67), and the lowest score was revealed in physical activity, 15.09 (4.62). Notably, perceived severity (adjusted  $\beta = 1.60$ ; 95% CI: 0.68, 2.53;  $p < 0.001$ ) and perceived social support (adjusted  $\beta = 0.63$ ; 95% CI: 0.37, 0.90;  $p < 0.001$ ) were positively related to HPB. In addition, educational level (adjusted  $\beta = -10.36$ ; 95% CI: 16.06, 4.67;  $p < 0.001$ ) and perceived benefits (adjusted  $\beta = -1.43$ ; 95% CI: -2.37, -0.48;  $p < 0.001$ ) were negatively related with HPB.

**Conclusion:** The Malay version of HBCVD is a valid and reliable tool for measuring health beliefs among single



mothers in Kelantan. Overall, the scores for HPB were moderate. Recognising the influential factors identified in the study could contribute to higher engagement in HPB and subsequently help reduce morbidity and mortality related to CVD.

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## PROFESSIONAL IDENTITY AMONG PAKISTANI AVIATION MEDICINE SPECIALISTS IN KSA: A QUALITATIVE STUDY

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**Introduction:** Although the military and commercial aviation industries are relatively new, they have experienced significant innovations and developments. Pakistan Air Force (PAF) maintains one of the largest air forces globally, with aviation specialists performing demanding operational commitments and deployments around the clock. Aviation medicine specialists, also known as flight surgeons, play a crucial role in the health and well-being of PAF aircrew and technical ground crew, ensuring their flying fitness. However, no study has previously examined the professional identity of PAF flight surgeons. This study explores the professional identity of Pakistani Aviation Medicine Specialists in the Kingdom of Saudi Arabia. A qualitative design was employed, with thematic analysis as the selected method for analysis. PAF male flight surgeons with a minimum of five years of experience in the field were recruited. The study included 13 participants, selected through purposive sampling. Participants provided consent after reviewing an information sheet that described the study.

**Objectives:**

**General objective:**

- To explore the professional identity of Pakistani Aviation Medicine Specialists/Flight Surgeons working in Kingdom of Saudi Arabia (KSA).

**Specific Objective:**

- To investigate the specific attributes and components that constitute the professional identity of Pakistani Aviation Medicine Specialists in KSA.
- To analyse the role of personal values and professional competencies in shaping the professional identity of Pakistani Aviation Medicine Specialists in KSA.

**Material and Methods:** A qualitative design was employed using phenomenological approach by conducting semi-structured interviews, that were later transcribed verbatim with thematic analysis as the selected method

for data analysis using Atlas.ti software. PAF male flight surgeons with a minimum of five years of experience in the field were recruited. This study included 13 participants, recruited through purposive sampling. All participants provided consent after reviewing an information sheet that described the study. Confidentiality of all participants was ensured.

**Result:** Semi-structured interviews with experienced flight surgeons were analysed to understand their professional identity. After through thematic analysis by open coding, nine sub themes were generated which were merged into four main themes that were: professional identity in aviation medicine, qualities of a good aviation medicine specialist, becoming a successful aviation medicine specialist, and professionalism and willingness.

**Conclusion:** In conclusion, the thematic analysis of this research elucidates the complex landscape of aviation medicine, characterised by dynamic challenges and specific requirements. The identified themes reveal critical aspects of managing and succeeding in this field, including the importance of balancing medical and operational goals, maintaining professionalism, and fostering effective communication. The study underscores the need for evidence-based approaches, collaborative methods, and continuous learning to address the evolving demands of aviation medicine. The findings highlight the importance of resilience, dedication, and adaptability in ensuring the safety and well-being of aircrew, emphasising the critical role of aviation medicine in the broader context of aviation operations.

*Supervisor:*

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## REFLECTIVE WRITING IN MEDICAL STUDENTS IN UNIVERSITI SAINS MALAYSIA (USM) AND ITS ASSOCIATIONS

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**Introduction:** Medical students across many countries still showed limited competency in reflective writing skills. However, reflective writing has been proposed to foster reflective practice that is important in clinical practice.

**Objectives:** Hence, this study aimed to determine the level and skills of reflective elements in first-year medical students' writing assignments using the REFLECT rubric among first-year medical students in Universiti Sains Malaysia (USM) and its associations with demographic factor, academic and clinical performance.

**Materials and Methods:** The study randomly selected 350 (83.33%) reflective writing documents from a total of 420 documents submitted by first-year medical students in Medical Professionalism course. These

documents were graded by four calibrated raters using Reflection Evaluation for Learners' Enhanced Competencies Tool (REFLECT) rubric tool, designed to assess written reflections. Demographic factors included age, sex, pre-university education, Mini Multiple Interview (MMI) scores, Cumulative Grade Point Average (CGPA) of the first and third year, and Objective Structured Clinical Examination (OSCE) scores in third year. Descriptive data and statistical data (Pearson or Spearman for continuous variables, and independent T-test or one-way ANOVA for categorical variables) was performed using SPSS version 27.0.

**Results:** The average total reflective writing score for first-year medical students was 15.21 (SD = 2.18) out of 20. Female students reported significantly higher total reflective writing scores (M = 15.42, SD = 2.19) and "attending to emotion" scores (M = 3.22, SD = 0.59) compared to male students (M = 14.71, SD = 2.09, and M = 2.81, SD = 0.68, respectively). This study also reported significant correlation between first-year CGPA and several domains of reflective writing

**Conclusion:** In conclusion, the study indicates that reflective writing skills among medical students at USM is influenced by sex and it has a significant role in academic performance. Fostering reflective writing should be promoted in medical training by considering inclusive approaches that incorporates sex-sensitive pedagogies.

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## EVALUATING THE RESILIENCE LEVEL AMONG NURSING STUDENTS IN USM AND ITS ASSOCIATION TO PSYCHOLOGICAL PARAMETERS

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**Introduction:** The level of resilience among nurses and nursing students is known to be high globally and also in our country, Malaysia. Resilience is associated with many psychosocial and psychological factors especially stress, depression and anxiety among nurses and nursing students.

**Objectives:** Hence, this study aimed to evaluate the resilience level among nursing students in Universiti Sains Malaysia (USM) and its association to psychological parameters.

**Materials and Methods:** The study was participated by 186 (77.1%) USM nursing students out of 240 USM nursing students from diploma and degree nursing programme. The students were from year one to year four selected using purposive sampling. An online Google Form questionnaire consisting of demographic data, Connor-Davidson Resiliency Scale 25 (CD-RISC 25) and the General Health Questionnaire (GHQ-28) was distributed using

WhatsApp application. Demographic data included gender, age, years of study and educational level. The outcome was in the form of level of resilience in which was categorised into significant and non-significant resilience level based on the CD-RISC 25 score. Each domain of resilience was analysed using appropriate statistical analysis. Gender and educational level were analysed using an independent *t*-test. Next, years of study and age were analysed using One-way ANOVA test. In addition, association of level of resilience and psychological parameters was analysed using multiple linear regression test.

**Results:** The response rate was 77.5%. The distribution of nursing students responded was according to the current proportion by gender, age, educational level and year of study. The highest mean among five domains of resilience scale was management of negative emotions or stress with mean: 3.621 (SD:0.68). There was a negative correlation between gender and years of study in domains of resilience scale and it was statistically significant ( $P < 0.001$ ). Resilience level was significantly associated level of education and age. There were association of domains of resilience scale associated with parameters of psychological score which are somatic symptoms and anxiety and insomnia.

**Conclusion:** There was high resilience among nursing students in USM and the level of resilience was associated with psychological parameters. Hence, measures need to be taken to enhance resilience among nursing students to overcome psychological distress academically and clinically. Resilience should be possessed by nursing students to overcome psychological challenges.

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## DEVELOPMENT AND VALIDATION OF MEDICAL STUDENTS' DIGITAL HEALTH COMPETENCIES SCALE

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**Introduction:** Digital health offers numerous advantages, including increased access to care, cost reduction, enhanced efficiencies, improved patient satisfaction, and higher-quality care. As a result, medical students' digital health competence is an important area to study as the healthcare sector landscape changes globally. However, no instruments with psychometric evidence of validity and reliability depict digital health skills have been examined among medical students in Malaysia.

**Objectives:** Therefore, the present study aimed to develop and validate the Medical Students' Digital Health Competencies Scale (MS-DHCS).

**Materials and Methods:** A study was done to develop and validate a questionnaire that consisted of five stages:

domain identification, item generation, content validation, face validation, and internal structure assessment. Domain identification through literature review was conducted by the main researcher, item generation through literature review, content validation involved six content experts and face validation involved 10 medical students from Universiti Malaysia Sabah (UMS). A total of 160 MS-DHCS 3.0 forms containing 32 items were distributed for the internal structure assessment. EFA was conducted and Principal Axis Factoring (PAF) was used as an extraction method in EFA. Reliability was checked using Cronbach Alpha values.

**Results:** Three domains were identified for MS-DHCS and 39 items were generated for MS-DHCS 1.0. Content validation of 39-items MS-DHCS 1.0 revealed an S-CVI/Ave of 0.96 after two rounds review and face validation of 32-items MS-DHCS 2.0 revealed an S-FVI/Ave of 0.97 and MS-DHCS 3.0 were distributed to 160 medical students for internal structure assessment. EFA yielded three factors namely knowledge, skills and attitudes which cumulative percentage of variance of 51.7% to 62.6%. The range for factor loading for knowledge, skills and attitudes were 0.61–0.77, 0.69–0.87 and 0.59–0.77, respectively. The internal consistency was good to excellent with Cronbach's alpha ranging from 0.88 to 0.92 for all domains.

**Conclusion:** In conclusion, the 32 items – MS-DHCS is deemed valid and reliable to measure resilience among medical students. However, any attempt to generalise the findings to medical students in different settings should be done with cautious and further validation study need to be carried out.

*Supervisor:*

*Dr. Nik Mohd Rizal Mohd Fakri*

*Co-supervisors:*

*Associate Professor Dr. Mohd Zarawi Mat Nor*

*Dr. Jamilah Al-Muhammady Mohammad*

*Associate Professor Dr. Najib Majdi bin Yaacob*

## THE EFFECTS OF EMPAGLIFLOZIN ON HEPATIC PARAMETERS AND LIVER FAT CONTENT IN PATIENTS WITH TYPE 2 DIABETES MELLITUS: A SYSTEMATIC REVIEW AND META-ANALYSIS

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**Introduction:** Type 2 Diabetes Mellitus (T2DM) often coexists with hepatic complications, including Non-Alcoholic Fatty Liver Disease (NAFLD), posing significant challenges in treatment strategies. Empagliflozin, a Sodium-Glucose Co-Transporter 2 (SGLT2) inhibitor, has garnered attention for managing T2DM and improving hepatic parameters. However, existing evidence on its impact on hepatic outcomes in T2DM patients remains inconclusive, necessitating further investigation.

**Objective:** This meta-analysis aims to comprehensively evaluate the effect of empagliflozin on hepatic parameters and liver fat percentage (LFP) in individuals with T2DM.

**Methods:** Following PRISMA guidelines, a thorough search spanned databases such as PubMed, Scopus, Web of Science, Google Scholar, Cochrane Library, and ClinicalTrials.gov from inception to January 2023. The inclusion criteria includes patients with T2DM, interventions of empagliflozin versus placebo or standard treatment, and study with randomised controlled trial design. Exclusion criteria encompass book chapters, narrative reviews, and study protocols. Quality assessment followed the Revised Cochrane risk-of-bias tool for randomised trials (RoB 2). The effect size estimate was derived from post-treatment values of hepatic parameters (alanine aminotransferase (ALT), aspartate aminotransferase (AST), gamma-glutamyl transpeptidase (GGT)) and LFP, comparing empagliflozin-treated groups with other groups. Statistical analysis was performed using R Software version 4.2.3, involving determination of treatment effects, assessment of heterogeneity, and sensitivity analysis.

**Results:** The meta-analysis includes six studies, totalling 565 participants, with seven effect size estimates for ALT. For AST, six effect sizes from five studies were pooled (458 observations), while GGT analysis included data from four studies (353 observations), and LFP analysis involved two studies (202 observations). For ALT level, no significant mean difference (MD) in ALT levels was found between individuals treated with empagliflozin and the control group in the initial analysis (MD = -5.59; 95% CI [-10.98; 1.46];  $p = 0.100$ ). However, substantial heterogeneity ( $I^2 = 85\%$ ) indicated considerable variability among studies. Further exploration revealed significant variability ( $Q = 41.30$ ,  $p < 0.001$ ) and wide prediction interval (PI) that ranged from -22.80 to 11.62. Upon sensitivity analysis and removal of influential study, heterogeneity dropped from 85.5% to 0.0%, but the MD remained non-significant (MD = -2.08; 95% CI [-5.82; 1.65],  $p = 0.211$ ). In our analysis of AST levels, the initial meta-analysis showed no significant difference in AST levels between empagliflozin-treated individuals and the control group (MD = -5.44; 95% CI [-11.02–0.14];  $p = 0.054$ ). Despite this, there was substantial heterogeneity ( $I^2 = 82\%$ ) among the studies, indicating diverse effects. Further heterogeneity tests confirmed significant variability ( $Q = 27.77$ , d.f. = 5,  $p < 0.001$ ), suggesting underlying factors contributing to differences across studies. The wide prediction interval (-19.49 to 8.61) indicates uncertainty in estimating the true treatment effect. Sensitivity analyses identified one influential study. Removing this study reduced heterogeneity (from 82.0% to 26.8%), but the MD remained non-significant (MD = -2.54; 95% CI [-6.50; 1.42],  $p = 0.150$ ). Despite efforts to address heterogeneity, statistically significant results were not obtained, indicating a trend but lacking statistical significance for AST levels. In our analysis of GGT levels, the pooled estimate revealed a significant difference in post-treatment GGT levels between individuals treated with empagliflozin and the comparator groups (MD = -10.86; 95% CI [-20.18; -1.53],  $p = 0.034$ ), with heterogeneity below the threshold of significance ( $I^2 = 31\%$ ). PI for GGT level spanned from -29.18 to 7.47. No study was removed as influential for GGT level. The analysis of LFP showed a non-significant mean difference (MD -4.903, 95% CI [-9.869; 0.064],  $p = 0.0507$ ). Only two studies were included in the analysis for LFP, precluding subsequent

analyses for heterogeneity, publication bias, sensitivity analysis, and influential analysis due to the limited sample size.

**Conclusion:** Empagliflozin did not significantly affect ALT and AST levels at 10 mg dosage. Higher dosage (25 mg) may benefit liver parameters. Significant reduction in GGT levels was observed, yet with limited data. No significant impact on LFP was noted. Further research is warranted to explore empagliflozin's efficacy at 25 mg dosage for improving hepatic outcomes.

*Supervisor:*

Associate Professor Dr. Najib Majdi Yaacob

*Co-supervisor:*

Associate Professor Dr. Kueh Yee Cheng

### TIME TO READMISSION AND ITS PROGNOSTIC FACTORS AMONG HOSPITALISED HEART FAILURE PATIENTS IN KELANTAN

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**Introduction:** Heart failure (HF) is a common comorbidity among adult population and is associated with poor outcomes. One challenging aspect of it is the issue of recurrent admissions leading to significant healthcare burden.

**Objectives:** The aim of this study is to explore the proportion of readmission, median time and prognostic factors for time to readmission among hospitalised HF patients in Kelantan

**Materials and Methods:** This retrospective cohort study involved patients admitted primarily for HF in Hospital Raja Perempuan Zainab II from October 2021 until December 2022. Inclusion criteria include adult Malaysian citizen, age 18 years old and above with formal echo finding within one year of index hospitalisation. Those with in-patient mortality, transferred to another facility upon discharge or discharge at own risk and those with active malignancy were excluded. The cohort were followed up until December 2023 to identify the event of readmission which is defined as admission due to acute illness. Patients who had no readmission, loss to follow-up or passed away were censored. Sociodemographic characteristics, clinical data during index hospitalisation including laboratory result and medication upon discharge were collected. Data was collected from electronic medical record based on standardised online data proforma and analysis was done using RStudio and StataMP. Prognostic factors for time to readmission were identified using multiple Cox regression analysis

**Results:** A total of 276 patients were included for analysis. Mean age was 60.64 years old. Most of them were Malays (95.3%) with higher proportion of male (53.6%). Common comorbidities include hypertension (81.5%), ischaemic heart disease (62%), type II diabetes mellitus (57.2%) and chronic kidney disease (50.4%). Proportion of readmission at 6 Month and 1 year post discharge was 51.8% (95% CI: 45.8, 57.8) and 63.4% (95% CI: 57.4, 69.0)

respectively. The cohort had median time to readmission of 118 days (95% CI: 90,149). Prognostic factors for time to readmission were atrial fibrillation (adjusted HR: 2.06, 95% CI: 1.42, 2.99,  $P < 0.001$ ), chronic kidney disease (adjusted HR: 1.53, 95% CI: 1.14, 2.04,  $P = 0.004$ ), albumin level (adjusted HR: 0.96, 95% CI: 0.94, 0.99,  $P = 0.005$ ), aspartate aminotransferase level (adjusted HR: 1.003, 95% CI: 1.001, 1.006,  $P = 0.022$ ) and ejection fraction  $\leq 40\%$  (adjusted HR: 1.37, 95% CI: 1.03, 1.84,  $P = 0.033$ ).

**Conclusion:** Hospitalised HF patients in Kelantan were relatively younger and had a higher rate of readmission compared to global figures at 6-month post discharge. Clinicians need to optimise patients prior to discharge with particular attention to the identified prognostic factors.

*Supervisor:*

Dr. Wan Nor Arifin Wan Mansor

*Co-supervisor:*

Associate Professor Dr. Sarimah Abdullah

### VALIDITY AND RELIABILITY OF THE MALAY TRANSLATED VERSION OF THE DIABETES HEALTH LITERACY SCALE AMONG MALAYSIAN ADULTS WITH TYPE 2 DIABETES MELLITUS

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**Introduction:** The instrument for measuring health literacy among Malaysian adults with type 2 diabetes mellitus (T2DM) is limited. A valid and reliable diabetes-specific health literacy instrument in Malay is required before it can be used in measuring diabetes health literacy and determining its relationship with other variables.

**Objective:** The aim of this study was to determine the validity and reliability of the Malay version of the Diabetes Health Literacy Scale (DHLS-M) among Malaysian adults with T2DM.

**Materials and Methods:** The Diabetes Health Literacy Scale (DHLS) was translated and culturally adapted into Malay, followed by a cross-sectional study which was conducted using a self-administered questionnaire among the adults with T2DM in Hospital Universiti Sains Malaysia (USM). The participants were recruited by convenience sampling. Confirmatory factor analysis (CFA), reliability testing and correlation analysis were performed.

**Results:** A total of 250 adults with T2DM were participated in this study. The median age of the participants was 63.0 years old (interquartile range, IQR = 12.3) and most of the participants were male (51.2%). The final measurement model of DHLS-M with removal of one problematic item, fit the data well based on several fit indices: Relative chi-square ( $\chi^2/df$ ) = 3.858, comparative fit index (CFI) = 0.981, Tucker–Lewis index (TLI) = 0.976. The composite reliability of the three subscales based on Raykov's rho were 0.962, 0.836 and 0.828 respectively. The subscales of DHLS-M were significantly correlated with the Malay version of the Michigan Diabetes Knowledge Test (MDKT) ( $r = 0.26-0.31$ )



and the Malay version of the short form Health Literacy Survey Questionnaire (HLS-SF12) ( $r = 0.43-0.66$ ).

**Conclusion:** DHLS-M which consisted of three subscales and 13 items is valid and reliable. DHLS-M can be used to measure diabetes health literacy among Malaysian adults with T2DM.

*Supervisor:*

Associate Professor Dr. Kueh Yee Cheng

*Co-supervisors:*

Dr. Wan Nor Arifin bin Wan Mansor

Associate Professor Dr. Wan Mohd Izani bin Wan Mohamed

Dr. Rosnani binti Zakaria

### TIME TO NON-PERSISTENCE OF SODIUM-GLUCOSE CO-TRANSPORTER 2 INHIBITORS AND ITS PROGNOSTIC FACTORS AMONG PATIENTS WITH TYPE 2 DIABETES IN UNIVERSITI MALAYA MEDICAL CENTRE

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**Introduction:** Sodium-glucose cotransporter-2 inhibitors (SGLT2i) have emerged as a new guideline-directed medical therapy (GDMT) for managing cardiovascular-kidney-metabolic (CKM) syndrome. Understanding the pattern of SGLT2i treatment persistence can help prevent unwarranted non-persistence of this GDMT and simultaneously, develop interventions to mitigate its negative consequences.

**Objectives:** This study aimed to evaluate the treatment persistence time on SGLT2i and to identify the prognostic factors for SGLT2i persistence time among adults with type 2 diabetes (T2D) at the Universiti Malaya Medical Centre, Kuala Lumpur, Malaysia.

**Methods:** This was a retrospective cohort study involving adults aged 18 years and above with T2D who were initiated with SGLT2i between January 2016 and December 2021. The study outcome was time to SGLT2i non-persistence, defined as the time to first 90-day gap after the estimated end date of pharmacy supply. Kaplan-Meier estimate was used for median SGLT2i persistence time, life table analysis was used for obtaining persistence rates and Cox Proportional Hazard regression was used to identify the prognostic factors for the time to treatment persistence.

**Results:** This study involved 602 adults with T2D, with the majority being male (52.0%). The mean age of patients was 60.1 years (standard deviation [SD] = 10.7). The median treatment persistence time was 40.5 months (95% confidence interval (CI): 34.6, 54.0). Treatment persistence rates reduced from 94.5% at 6 months to 78.0% at 1 year, and 62.7% at 2 years. Patients with baseline estimated Glomerular Filtration Rate (eGFR) < 60 ml/min/1.73m<sup>2</sup> had an adjusted hazard ratio (AHR) of 1.57 (95% CI 1.20, 2.04;  $p = 0.001$ ) for non-persistence of SGLT2i, compared to those with eGFR ≥ 60 ml/min/1.73m<sup>2</sup>. The use of DPP4i had an AHR of 0.75 (95% CI 0.57, 0.98;  $p = 0.042$ ) for non-persistence of SGLT2i.

**Conclusions:** Half of the patients discontinued SGLT2i within 3.5 years. Those with baseline eGFR < 60 ml/min/1.73m<sup>2</sup> and without concomitant DPP4i use were significantly associated with SGLT2i non-persistence. This study provides valuable insights into the time to SGLT2i non-persistence in adults with T2D and the underlying factors to facilitate more personalised diabetes management to optimise health outcomes.

*Supervisor:*

Dr. Siti Azrin Ab Hamid

*Co-supervisors:*

Associate Professor Dr. Kueh Yee Cheng

Associate Professor Dr. Lim Lee Ling

### SURVIVAL RATE AND PROGNOSTIC FACTORS OF SURVIVAL AMONG CHRONIC MYELOID LEUKAEMIA ADULTS AFTER INITIATION OF TYROSINE KINASE INHIBITOR THERAPY IN HOSPITAL AMPANG, SELANGOR

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**Introduction:** Chronic Myeloid Leukaemia (CML) management has been revolutionised by the advent of tyrosine kinase inhibitors (TKIs). Despite more than two decades since the introduction of TKIs in the Malaysian healthcare landscape, long-term outcomes have not been rigorously studied. Various factors may impact prognosis and understanding these factors may influence patient management and improve long-term outcomes.

**Objectives:** This study aims to estimate and compare the 10-year overall survival (OS) rates and to identify significant prognosis factors among adults diagnosed with CML on TKI therapy in Hospital Ampang, Selangor.

**Methods:** This retrospective cohort study reviewed the medical records of 389 CML patients aged 18 years and above who were initiated with TKIs – including imatinib mesylate or nilotinib – between 2012 and 2021, while patients who received haematopoietic stem cell transplantation (HSCT) therapy and transferred out were excluded. The primary outcome of interest was an event of death from any cause. Censored observations were considered for patients who remained alive at the end of the study or those who were lost to follow-up (LTFU). Survival time was the duration of time (months) from the initiation of TKI therapy in CML patients to the event. Kaplan-Meier product limit estimator and log-rank test were applied for univariable analysis, while Cox proportional hazards regression was applied in multivariable analysis to identify the significant prognostic factors for survival.

**Results:** There were 51 deaths (13.1%). Patients were followed up for a median of 74 months (interquartile range (IQR): 58 months) with a 10-year overall survival rate of 81.7%. The overall survival rates were significantly better for age < 60 years at the TKI therapy initiation ( $p < 0.001$ ),

Charlson Comorbidity Index 2–3 ( $p < 0.001$ ), baseline blasts  $< 10\%$  ( $p < 0.001$ ), low-risk prognosis scoring with EUTOS long-term survival score (ELTS) ( $p = 0.001$ ), chronic phase (CML-CP) at diagnosis ( $p < 0.001$ ), no CML disease progression ( $p < 0.001$ ), year of TKI therapy initiation between 2012–2015 ( $p < 0.001$ ), standard dose initial TKI regimen ( $p = 0.041$ ), high medication possession ratio (MPR) for TKI ( $p < 0.001$ ), no adverse events requiring TKI dose adjustment ( $p = 0.002$ ), no history of follow-up defaults ( $p = 0.015$ ), not more than three concurrent medications with TKI therapy ( $p < 0.001$ ), no TKI switching ( $p = 0.029$ ), complete cytogenetic response (CCyR) at 6 months ( $p = 0.035$ ), major molecular response (MMR) at 12 months ( $p = 0.035$ ), and 24 months ( $p < 0.001$ ). Four significant independent prognostic factors of survival among CML adults with TKI therapy identified were CML disease progression (adjusted hazard ratio (AHR) = 8.43; 95% confidence interval (CI): 3.95, 18.01;  $p < 0.001$ ), time to TKI initiation (100 days) (AHR = 1.22; 95% CI: 1.11, 1.35;  $p = 0.011$ ), three or more concurrent medications with TKI therapy (AHR = 7.59; 95% CI: 3.62, 15.91;  $p < 0.001$ ) and failure to achieve MMR at 24 months (AHR = 2.19; 95% CI: 1.04, 4.64;  $p = 0.039$ ).

**Conclusion:** The study emphasises the importance of therapy initiation and close monitoring for patients experiencing CML disease progression, delayed TKI commencement post-diagnosis, three or more concurrent medications alongside TKI, and failure to achieve MMR at 24 months to ensure improved long-term outcomes and overall survival.

Supervisor:

Dr. Siti Azrin binti Ab Hamid

Co-supervisors:

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Dr. Jerome Tan Tsen Chuen

## COMPARATIVE ANALYSIS OF NOTIFIED HAND, FOOT AND MOUTH DISEASE CASES BETWEEN KELANTAN AND PENANG

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**Introduction:** Hand, Foot and Mouth Disease (HFMD), primarily caused by enteroviruses like EV71 and CV-A16, remains a significant public health issue in Malaysia, particularly affecting children. Despite extensive efforts to manage HFMD, the incidence rate continues to rise, necessitating further investigation into regional differences and associated risk factors.

**Objectives:** This study aims to estimate the incidence rates and risk factors of notified HFMD cases between the states of Kelantan and Penang from 2017 to 2021. Specifically, it seeks to identify differences in incidence rates and the distribution of cases by age, gender, and race.

**Materials and Methods:** A comparative cross-sectional study design was employed, utilising secondary data from the Communicable Disease Control Information System

(CDCIS) e-Notification. The study population included all notified HFMD cases in Kelantan and Penang from 2017 to 2021. Statistical analyses, including chi-square tests, were conducted using R software to estimate incidence rates and demographic factors between the two states.

**Result:** From 2017 to 2021, 18,243 HFMD cases were reported, with 7,846 in Kelantan and 10,397 in Penang. The average incidence rate was higher in Penang (1.18 per 1,000 population) compared to Kelantan (0.49 per 1,000 population). The incidence was highest among children aged 0–4 years in both states, with significant differences in age distribution ( $\chi^2 (3) = 303.48$ ,  $p < 0.05$ ). Males had a higher prevalence of HFMD in both states, with a statistically significant difference in gender distribution ( $\chi^2 (1) = 6.885$ ,  $p = 0.009$ ). The Malay ethnic group had the highest number of cases in both states, but significant differences were observed in racial distribution ( $\chi^2 (4) = 4290.40$ ,  $p < 0.05$ ).

**Conclusion:** The study reveals significant regional differences in HFMD incidence rates and demographic factors between Kelantan and Penang. The findings highlight the need for targeted public health interventions, particularly focusing on young children and incorporating comprehensive health education tailored to different ethnic groups. Enhanced surveillance systems are crucial for early detection and effective management of HFMD outbreaks.

Supervisor:

Professor Dr. Kamarul Imran bin Musa

## JOB SATISFACTION AND ITS ASSOCIATED FACTORS AMONG MEDICAL AND HEALTH OFFICERS IN TERENGGANU

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**Introduction:** Understanding job satisfaction is crucial for enhancing higher levels of engagement, dedication, and commitment to work, which will improve the overall quality of healthcare services provided. However, there are limited studies on job satisfaction among medical and health officers in Malaysia in general and in Terengganu in particular.

**Objectives:** This study aimed to determine job satisfaction and its associated factors among medical and health officers working in primary healthcare in Terengganu.

**Materials and Methods:** In this cross-sectional study, medical and health officers from all eight district health offices and state health departments of Terengganu were randomly and proportionately selected as participants. These participants had worked for at least three months in the district health offices and state health departments of Terengganu. The study used the Malay version of the Psychosocial Aspect of Work Questionnaire (PAW-M) which was self-administered using a Google Form link. It consists of 15 items that measure three aspects of work: job satisfaction, social support, and the mental stress of work, and scored using a 5-point Likert scale. The data was analysed using SPSS version 27, and linear regression analyses were

applied to identify the factors that are associated with job satisfaction.

**Results:** A total of 200 medical and health officers participated in the study. The study indicates the medical and health officers had a mean (SD) job satisfaction score of 26.41 (4.7). The mean age of the participants was 35.45 (4.80), the mean of social support was 16.67 (2.32) and the mean of mental stress was 17.29 (2.07). The study identifies that satisfied with income (95% CI: 0.118, 2.317,  $p = 0.030$ ), permanent employment status (95% CI: 0.104, 3.403,  $p = 0.037$ ) and social support score (95% CI: 0.979, 1.432,  $p < 0.001$ ) as the significant associated factors for job satisfaction among study participants.

**Conclusion:** The study found that the mean job satisfaction score was 26.1, associated with satisfaction of income, permanent employment status, and social support score. Addressing these factors will boost job satisfaction among M&HO and thus improve the quality of primary healthcare services. Future research can be conducted among all medical doctors, particularly those with different working systems, such as working in hospitals or other healthcare facilities, to fully understand and compare job satisfaction and associated factors and the ways to improve it.

Supervisor:

Associate Professor Dr. Mohd Nazri bin Shafei

## TRENDS AND FACTORS ASSOCIATED WITH TUBERCULOSIS-RELATED MORTALITY DURING THE INTENSIVE PHASE OF ANTI-TUBERCULOSIS TREATMENT IN JOHOR FROM 2013 TO 2022

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**Introduction:** Tuberculosis (TB) remains a major global health challenge. In Malaysia, recent TB data reveal a significant deviation from the targets set by the End TB Strategy, with a 28% increase in TB fatalities in 2022 compared to 2021. Despite extensive TB control efforts, Johor state has witnessed fluctuating mortality rates during the intensive phase (IP) of anti-TB treatment, underscoring the need for an in-depth analysis of associated factors.

**Objectives:** This study aimed to describe the proportion and trends of TB-related mortality and its associated factors during the IP of anti-TB treatment in Johor from 2013 to 2022.

**Materials and Methods:** A case-control study was conducted in January 2024 until the end of May 2024 using secondary data from the MyTB system. The proportion of TB-related mortality and total of TB cases were calculated based on the data extracted from MyTB system with no sampling method applied. A case ( $n = 372$ ) consists of a TB patient who dies due to TB during the IP and the control group ( $n = 1671$ ) was randomly selected from TB cases who survived during the IP. Descriptive statistics and logistic regressions were employed for data analysis using SPSS version 29.

**Results:** The proportion of TB-related mortality during IP in Johor between 2013 and 2022 ranged from 0.8% to 3.6%. The ten-year trends are fluctuating with 2022 showing the highest. From 2,043 respondents, the mean age was 49.2 (17.02) and 42.5 (17.55) for the cases and controls, respectively. The majority of the respondents were male (76.3%), Malaysian nationality (89.5%), from urban areas (65.1%), HIV-negative status (81.5%), received BCG vaccination (86.8%) and from new TB cases category (92.2%). The significant independent risk factors for TB-related mortality during IP were being older than 65 years (AOR: 10.14; 95% CI: 1.27, 80.7;  $p = 0.029$ ), living in an urban area (AOR: 0.55; 95% CI: 0.35, 0.86;  $p = 0.008$ ), HIV-positive (AOR: 2.95; 95% CI: 1.53, 5.69;  $p = 0.001$ ), positive sputum AFB (AOR: 2.42; 95% CI: 1.43, 4.10;  $p = 0.001$ ), far-advanced lesions on chest radiograph (AOR: 14.53; 95% CI: 7.12, 29.64;  $p < 0.001$ ), initiating treatment at a government hospital (AOR: 5.73; 95% CI: 2.07, 15.86;  $p < 0.001$ ), and adherence to DOTS (AOR: 0.009; 95% CI: 0.006, 0.015;  $p < 0.001$ ).

**Conclusion:** This study highlights fluctuating trends in TB-related mortality during the IP, with a notable peak in 2022. Public health strategies should focus on early detection, integrated TB-HIV care, and strict adherence to DOTS, particularly for high-risk populations. In line with the National TB End Strategy, these findings are crucial for guiding future interventions and policies aimed at reducing TB mortality rates and improving treatment outcomes in Johor and similar settings.

Supervisor:

Dr. Mohd Yusof Sidek

Co-supervisor:

Associate Professor Dr. Nik Rosmawati Nik Husain

## PERINATAL ASPHYXIA AND ITS ASSOCIATED FACTORS AMONG PERINATAL MORTALITY IN KELANTAN FROM 2020-2022

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**Introduction:** Perinatal mortality remains a significant public health concern globally, with neonatal deaths accounting for nearly half of all under-five deaths. Perinatal asphyxia is a major contributor to perinatal mortality, especially in low- and middle-income countries. Perinatal asphyxia is the second largest preventable cause of perinatal death in Malaysia. However, the specific burden and factors associated with this perinatal asphyxiation death are still unclear in Malaysia in general and in Kelantan in particular.

**Objectives:** This study aimed to determine the proportion of perinatal asphyxia and its associated factors among perinatal mortality cases in Kelantan, Malaysia, from 2020 to 2022.

**Materials and Methods:** This cross-sectional study was conducted between December 2023 and June

2024 based on a retrospective review of perinatal mortality data by the Kelantan State Health Department from 2020 to 2022. Secondary data for this study were obtained from the Stillbirth and Under-five Mortality Notification System and Stillbirth and Under-five Mortality Investigation Form. A total of 397 deaths were selected using a simple random sampling method using Microsoft Excel. Sociodemographic, obstetric, and intrapartum factors have been taken from records and analysed using descriptive analysis, simple logistical regression and multiple logistic regression to identify factors associated with perinatal asphyxia.

**Results:** Out of 397 perinatal mortality cases reviewed, the proportion of perinatal asphyxia was 25.9%. The multivariate analysis showed that non-Malay mothers (aOR = 2.70, 95% CI: 1.18–6.22,  $p = 0.019$ ), inadequate antenatal follow-up or unbooked mothers (aOR = 2.95, 95% CI: 1.66–5.22,  $p < 0.001$ ), late preterm birth (aOR = 2.49, 95% CI: 1.20–5.18,  $p = 0.014$ ), and caesarean section deliveries (aOR = 2.52, 95% CI: 1.51–4.21,  $p < 0.001$ ) were significantly associated with perinatal asphyxia.

**Conclusion:** Perinatal asphyxia accounts for a substantial proportion of perinatal mortality in Kelantan, Malaysia. Maternal factors, such as non-Malay mothers, mothers attending inadequate antenatal follow-up or unbooked mothers; late premature births and caesarean births are significantly associated with perinatal mortality caused by perinatal asphyxia. Identifying these related factors can help improve future strategies and interventions such as improving antenatal care, improving intrapartum management, and strengthening the ability to provide health care. It can also help to improve service quality and reduce the number of deaths caused by perinatal asphyxia across the country. Further research is needed to explore the underlying causes and develop context-specific strategies to address the high burden of perinatal mortality in Kelantan.

Supervisor:

Dr. Raishan Shafini binti Bakar

## HAEMOGLOBIN A1C, BLOOD PRESSURE AND LDL-CHOLESTEROL GOALS ATTAINMENT AND ITS ASSOCIATED FACTORS AMONG ADULTS WITH EARLY-ONSET TYPE 2 DIABETES IN TERENGGANU, 2023

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**Background:** The global and local increase in prevalence of diabetes mellitus presents a significant public health challenge. Early-onset type 2 diabetes, diagnosed between ages 18 and 45 years, is increasingly common and associated with a heightened risk of complications. Therefore, achieving the ABC goals (HbA<sub>1c</sub> < 7%, blood pressure < 140/90 mmHg, and LDL-C < 100 mg/dL) is essential for managing diabetes and reducing the complications.

**Objective:** This study aims to determine the attainment of two or more ABC goals and its associated factors among

adults with early-onset type 2 diabetes in Terengganu in 2023.

**Methodology:** A cross-sectional study design was employed, utilising secondary data of adults with early-onset type 2 diabetes who were audited in the National Diabetes Registry in Terengganu in 2023. A simple random sampling was applied to select the required sample of 675. Data on sociodemographic characteristics, lifestyle factors, and diabetes treatment profiles were extracted and analysed using SPSS version 28. Descriptive statistics and multiple logistic regression were used to summarise the data and identify factors associated with achieving two or more ABC goals.

**Results:** The mean age of the participants was 46.8 years (SD 7.86). The majority of the patients were female (68.3%), of Malay ethnicity (97.9%), and non-smokers (95.4%). The proportion of attainment two or more goals was 36.4%. Women are 38% less likely than men to achieve two or more ABC goals, with a statistically significant odds ratio (OR) of 0.63 (95% CI: 0.44 to 0.88,  $p = 0.007$ ). Regarding treatment types, individuals on oral treatment alone have 2.49 times higher odds of achieving these goals compared to those on a combination of oral treatment and insulin (95% CI: 1.77 to 3.49,  $p < 0.001$ ). Additionally, those not on any treatment have 2.76 times higher odds of reaching the goals compared to those on the combination treatment (95% CI: 1.11 to 6.91,  $p = 0.030$ ).

**Conclusion:** These findings highlight significant challenges in comprehensive diabetes control among adults with early-onset type 2 diabetes in Terengganu, with notable sex-based disparities and treatment profiles in goal attainment. Effective diabetes management requires addressing gender-specific challenges and modality of treatment profiles through public health campaigns, interdisciplinary strategies, and personalised care. Additionally, achieving the recommended ABC goals is more likely in patients who take fewer medications for diabetes.

Supervisor:

Associate Professor Dr. Tengku Alina Tengku Ismail

## PROPORTION OF THE PROCESSED FOOD AND ULTRA-PROCESSED FOOD CONSUMPTION AND ITS ASSOCIATED FACTORS AMONG ADULT ATTENDING GENERAL CLINIC AT HOSPITAL UNIVERSITI SAINS MALAYSIA

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**Introduction:** Nutritional-related diseases have emerged as a major public health concern, contributing to premature mortality and significantly impacting the increasing prevalence of obesity, non-communicable diseases, and cardiovascular disease. Processed food and ultra-processed food are usually formulated industrially. Ultra-processed food is characterised by its energy- density, reduced nutritious ingredients, and hyperpalatable taste, and it has strong links with adverse health outcomes



**Objective:** This study aimed to determine the proportion of the processed food and ultra-processed food consumption among adults attending general clinics at Hospital USM and its associated factors.

**Materials and Methods:** This is a cross-sectional study that collected primary data from adults who went to general clinics at Hospital USM using a sociodemographic and Malay-validated food frequency questionnaire based on NOVA classification. We assessed the ultra-processed food diversity score by summing the different ultra-processed foods consumed within a week, which facilitated the classification of low and high consumption. Multiple logistic regression was used to predict factors associated with an increased level of ultra-processed food consumption among adults attending general clinics at Hospital USM.

**Results:** The majority of the respondents were female (64.6%), Malay (90.8%), single (62.2%), and belonged to the B40 household income group (68.1%). The most common ultra-processed foods consumed were packaged bread, yellow noodles, cocoa drinks, and flavoured milk drinks. The proportion of respondents who had a high ultra-processed food diversity score was 54%, indicating more than half had consumed ultra-processed food seven times per week. Screen time (AOR 2.148, 95% CI: 1.181–3.906,  $P = 0.012$ ), having received financial aid (AOR 2.436, 95% CI: 1.267–4.684,  $P = 0.008$ ), and being unemployed (AOR 2.436, 95% CI: 1.267–4.684,  $P = 0.023$ ) were significantly associated with high consumption of ultra-processed among adults aged 18–39 years old attending general clinics Hospital USM.

**Conclusion:** In conclusion, most adults attending general clinics in Hospital USM consume ultra-processed food regularly. The factors identified in this study may suggest areas of action for policymakers to explore ways to limit ultra-processed food consumption to achieve better health outcomes.

*Supervisor:*

*Associate Professor Rohana binti Abdul Jalil*

## PROPORTION AND FACTORS ASSOCIATED WITH UNFAVOURABLE OUTCOMES AMONG PULMONARY TUBERCULOSIS PATIENTS IN KELANTAN: 10 YEARS PERSPECTIVE

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**Introduction:** Tuberculosis (TB) is a major global health concern and a leading cause of death worldwide. Despite significant efforts to control TB, unfavourable treatment outcomes remain a challenge.

**Objective:** To determine the proportion of unfavourable outcomes and identify factors associated among PTB patients in Kelantan from 2013 to 2022.

**Materials and Methods:** A retrospective cohort study design was employed, utilising secondary data from the National Tuberculosis Registry (NTBR) in Kelantan. The study included 1,260 PTB patients selected through simple random sampling. Data on sociodemographic characteristics, comorbidities, and clinical features were analysed using

descriptive statistics, and univariable, and multivariable logistic regression analyses.

**Results:** The proportion of unfavourable outcomes among PTB patients was 20.8%. Key factors associated with unfavourable outcomes included positive HIV status (Adjusted OR 5.69, 95% CI: 3.78–8.57,  $p < 0.001$ ), multidrug-resistant TB (MDR-TB) status (Adjusted OR 5.69, 95% CI: 2.40–13.52,  $p < 0.001$ ), and DOTs supervision by family members (Adjusted OR 5.02, 95% CI: 1.73–14.59,  $P = 0.003$ ).

**Conclusion:** The findings highlight significant challenges in managing PTB, particularly among HIV-positive and MDR-TB patients and underscore the importance of professional supervision in DOTs. These insights are crucial for developing targeted interventions to improve PTB treatment outcomes in Kelantan.

*Supervisor:*

*Professor Dr. Aziah Daud*

## BREAST CANCER AWARENESS AND FACTORS ASSOCIATED WITH BREAST SCREENING UPTAKE AMONG WOMEN IN KELANTAN

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**Introduction:** Breast cancer remains a significant public health challenge, both globally and in Malaysia. Late presentation of breast cancer often results in lower survival rates and higher mortality due to the advanced stage of the disease at diagnosis. Early detection through screening methods is crucial for improving survival rates. Despite this, the breast screening uptake in Kelantan remains low.

**Objectives:** To investigate breast cancer awareness, perceived barriers to healthcare-seeking, breast screening uptake and factors associated with breast screening uptake among women in Kelantan.

**Materials and Methods:** A cross-sectional study was conducted using convenience sampling to select 242 women in Kelantan between November 2023 and June 2024. The Breast Cancer Awareness Measure Malaysia (BCAM-M) questionnaire, which consists of 60 items across six domains: sociodemographic, awareness of breast cancer signs and symptoms, awareness of risk factors, barriers to healthcare-seeking, breast self-examination practices, and breast screening uptake, was used for data collection. This study defined breast screening uptake as having ever undergone a clinical breast examination (CBE). Descriptive statistics and logistic regression analyses were performed to identify the factors associated with breast screening uptake.

**Results:** Of 242 participants, 59.5% (95% CI 53.28, 65.73) were aware of breast cancer signs and symptoms, 17.4% (95% CI 12.55, 22.16) were aware of age-related risks, and 22.7% (95% CI 17.41, 28.04) were aware of breast cancer risk factors. Perceived barriers to healthcare-seeking were reported by 10.3% of participants, and 80.2% resided within five kilometres of a healthcare facility. Additionally, 40.5% (95% CI 46.0, 51.0) practised BSE regularly, 60.3%

(95% CI 54.12, 66.54) had undergone a CBE, and 25.9% (95% CI 17.79, 34.01) of women aged 40 years and above had undergone a mammogram. Factors significantly associated with breast screening uptake were being married (AOR 4.78; 95% CI 2.20, 10.40), being divorced (AOR 4.99; 95% CI 1.35, 18.50), healthcare-seeking within two months (AOR 3.68; 95% CI 1.98, 6.85), ever heard of CBE (AOR 7.41; 95% CI: 2.55, 21.54), and residing within five kilometres of a healthcare facility (AOR 2.39; 95% CI 1.17, 4.89).

**Conclusion:** The findings help health sectors design tailored interventions for specific identified groups to increase breast cancer awareness and screening uptake. Implementing these targeted strategies could enhance early detection, higher survival rates, and reduce breast cancer mortality.

*Supervisor:*

Associate Professor Dr. Nik Rosmawati binti Nik Husain

## CATASTROPHIC HEALTH EXPENDITURE AND ITS ASSOCIATED FACTORS AMONG ADULT CANCER PATIENTS IN HOSPITAL UNIVERSITI SAINS MALAYSIA

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**Introduction:** High out-of-pocket (OOP) health expenditures due to costly treatments and prolonged care, poses a substantial risk of catastrophic health expenditure (CHE) for households. Catastrophic health expenditure among households affected by cancer can be devastating for families already facing the emotional and psychological challenges of cancer diagnosis and treatment.

**Objectives:** The purpose of this study was to determine the proportion of CHE and its associated factors among adult cancer patients at Hospital Universiti Sains Malaysia.

**Materials and Methods:** A cross-sectional study was conducted with 209 adult cancer patients at Hospital Universiti Sains Malaysia from December 2023 to April 2024. Participants were selected using systematic random sampling and data were collected through guided face-to-face interviews. The proforma used included sections on sociodemographic details, disease information, household details, and expenditure and income. The primary outcome was the proportion of patients experiencing CHE, defined as OOP health expenses exceeding 10% of household income. Multiple logistic regression analysis was employed to identify factors associated with CHE.

**Results:** The study revealed that 15.3% of the participants experienced CHE. Significant factors associated with CHE included ethnicity, education level, GL status, and the employment status of the household head. Non-Malay patients had 6.63 times the odds of experiencing CHE compared to Malay patients ( $P = 0.013$ , 95% CI: 1.49, 29.57). Patients with primary school education or below had 9.56 times the odds of experiencing CHE compared to those with tertiary education ( $P = 0.005$ , 95% CI: 2.01,

45.57). Patients without GL were 4.81 times more likely to experience CHE than those with GL ( $P = 0.008$ , 95% CI: 1.51, 15.34). Households where the head was unemployed had 6.55 times the odds of experiencing CHE compared to those with employed heads ( $P = 0.014$ , 95% CI: 1.46, 29.35).

**Conclusion:** The study highlights significant sociodemographic and household factors contributing to CHE among adult cancer patients in Hospital Universiti Sains Malaysia. These findings emphasise the need for targeted interventions to mitigate financial burdens on cancer patients, particularly focusing on education, employment, and financial support mechanisms.

*Supervisor:*

Dr. Surianti binti Sukeri

*Co-supervisors:*

Associate Professor Dr. Azlan bin Husin

Dr. Norazlina binti Mat Nawi

## PREVALENCE AND FACTORS ASSOCIATED WITH SEROLOGICALLY CONFIRMED YAWS INFECTION AMONG ORANG ASLI POPULATION IN HULU TERENGGANU, MALAYSIA

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**Introduction:** Yaws, caused by *Treponema pallidum* subspecies *pertenue*, is a major public health concern in tropical regions, affecting primarily children and marginalised communities, such as the Orang Asli in Hulu Terengganu, Malaysia. This reemerging neglected tropical disease poses a challenge to the global elimination efforts endorsed by the World Health Organization (WHO), highlighting the need for local epidemiological data to guide eradication strategies, thereby informing targeted interventions aligned with WHO's elimination goals.

**Objectives:** This study aimed to determine the prevalence and identify factors associated with serologically confirmed yaws infections among the Orang Asli population in Hulu Terengganu, Malaysia.

**Materials and Methods:** This cross-sectional study utilised secondary data from the Event-Based Surveillance Database of the Terengganu State Health Department. A total of 249 Orang Asli individuals were included. The prevalence of yaws was calculated, and multiple logistic regression was used to determine factors associated with serologically confirmed yaws infection.

**Results:** The study found that the prevalence of yaws infection in Hulu Terengganu, Malaysia is 17.3%, (95% CI: 0.128, 0.225) or 17,300 per 100,000 population in 2020. Age was the only significant predictor of yaws infection, with an adjusted odds ratio (AOR) of 0.977 (95% CI: 0.959, 0.995;  $p = 0.012$ ) per additional year, demonstrating that the risk of infection is decreasing with increment of age. No significant associations were found for gender, marital status, education level, and employment status with yaws infection.

**Conclusion:** The high prevalence of yaws infection among Orang Asli in Hulu Terengganu highlights the need for focused public health interventions, enhanced surveillance, and research efforts, particularly within indigenous and marginalised communities. The study's findings support the need for implementation of targeted prevention and treatment programmes towards the risky population in Malaysia.

*Supervisor:*

Associate Professor Dr. Wan Mohd Zahiruddin bin Wan Mohammad

### COMMUTING INJURY AMONG MINISTRY OF HEALTH STAFF IN KELANTAN, MALAYSIA FROM 2016 TO 2022 AND ITS ASSOCIATED FACTORS

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**Introduction:** Commuting accidents pose significant occupational health risks, especially for healthcare workers (HCWs), affecting both personal safety and healthcare delivery. These incidents can lead to severe injuries, disrupt healthcare services, and impact overall productivity. Despite their critical role, there is limited research on the specific factors contributing to commuting accidents among HCWs, particularly in regions like Kelantan, Malaysia.

**Objective:** The study aimed to describe sociodemographic characteristics, to determine proportion, trends, and associated factors of commuting accident injuries among Ministry of Health (MOH) staff in Kelantan, Malaysia.

**Materials and Methods:** This cross-sectional study utilised secondary data from the Kelantan Workers Environment Health Unit (WEHU) A1/A2 registry, covering the period from 2016 to 2022. The study included 430 MOH staff who met the study criteria. Descriptive statistics were used to summarise the data, and logistic regression analyses were employed to identify factors associated with commuting accident injuries.

**Results:** The study participants had a mean age of 38.1 years, with a majority being females (54.0%) and health professionals (52.1%). Commuting accidents predominantly occurred during the morning commute (53.7%). Motorcyclists experienced the highest number of injuries, accounting for 57.7% of the total injuries. The proportion of injuries among commuting accident cases varied over the years, peaking in 2016 at 91.7%. Logistic regression analysis identified gender and mode of transportation as significant factors: male staff had higher odds of injury compared to female staff (adjOR: 2.11, 95% CI: 1.24–3.60), while motorcyclists had higher odds of injury (adjOR: 4.98, 95% CI: 2.27–10.89).

**Conclusion:** The findings underscore the need for targeted interventions, such as road safety education programmes for motorcyclists, fatigue management initiatives, and policy measures to reduce commuting risks. Enhancing road safety and implementing tailored

interventions for high-risk groups can help reduce the incidence of these injuries and improve occupational health and safety for healthcare workers.

*Supervisor:*

Dr. Ahmad Filza bin Ismail

### PROGNOSTIC FACTORS OF DIABETIC RETINOPATHY AMONG ADULT PATIENTS WITH TYPE II DIABETES MELLITUS IN KELANTAN FROM 2013 TO 2017

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**Introduction:** Diabetic Retinopathy (DR), a common and severe complication of diabetes, is a leading cause of blindness and significantly affects quality of life. In Kelantan, the high prevalence of diabetes and the substantial proportion of patients with DR highlight a critical public health challenge.

**Objectives:** This study aims to determine the event probability of DR and identify its prognostic factors among adult patients with type II diabetes mellitus (T2DM) in Kelantan from 2013–2017.

**Materials and Methods:** A retrospective cohort study was conducted in Kelantan among adult patients with type II diabetes mellitus (T2DM) registered in the National Diabetic Registry (NDR) from 1<sup>st</sup> January 2013 to 31<sup>st</sup> December 2017. Simple random sampling was used to select the cases. Survival analysis was used to examine time to diabetic retinopathy. The Cox Proportional-Hazards Regression Model is used to analyse prognostic factors.

**Results:** In the final analysis of 1372 adult patients with T2DM, 11.9% developed DR over the study duration, with an increasing trend over five years (reaching 9.5% by the fifth year). Significant prognostic factors for DR progression were age, hypertension, nephropathy, HbA1c levels, and triglyceride (TG) levels. Patients aged 60 or older exhibited a significantly higher hazard of developing DR compared to those under 60 years old (Adj. HR: 1.85; 95% CI: 1.30, 2.62). Those with nephropathy were at a substantially increased hazard of DR compared to those without nephropathy (Adj. HR: 3.46; 95% CI: 2.41, 4.97). Patients with HbA1c levels of 6.5 and above were more likely to develop DR than those with levels below 6.5 (Adj. HR: 1.42; 95% CI: 1.01, 2.02). An increase in TG levels was associated with a higher hazard of progression to DR (Adj. HR: 1.18; 95% CI: 1.03, 1.34). Those with hypertension had a decreased hazard of developing DR compared to those without hypertension (Adj. HR: 0.33; 95% CI: 0.24, 0.47).

**Conclusion:** Our study reveals a significant increase in DR prevalence with longer durations of diabetes mellitus. We identified older age, nephropathy, elevated HbA1c, and high TG levels as prognostic factors for DR in T2DM patients, while hypertension surprisingly showed a protective effect. These findings highlight the importance of risk factor identification for targeted prevention strategies, potentially

improving patient management and quality of life by mitigating DR incidence and severity in T2DM.

*Supervisor:*

Associate Professor Dr. Azriani binti Ab Rahman

## PREHYPERTENSION AND ITS ASSOCIATED FACTORS AMONG TYPE II DIABETES MELLITUS PATIENTS IN KELANTAN

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**Introduction:** Prehypertension is defined by systolic blood pressure ranging from 120 to 139 mmHg and/or diastolic blood pressure of 80 to 89 mmHg. Type II Diabetes Mellitus (T2DM) patients with prehypertension face higher risks of cardiovascular morbidity and mortality compared to normotensive T2DM patients. However, many T2DM patients remains unaware of their prehypertensive status and the associated increased CVD risks.

**Objective:** This study aims to determine the proportion of prehypertension and its associated factors among type II diabetes mellitus patients in Kelantan for year 2022.

**Materials and Methods:** This cross-sectional study was conducted from December 2023 to June 2024 using secondary data from Kelantan National Diabetes Registry (NDR) clinical audit datasets for the year 2022. Data of T2DM patients who were more than 18 years old and documented not hypertensive in the registry was collected using a proforma and analysed using IBM SPSS version 28 software.

**Results:** There were 8657 T2DM patients clinical audit datasets in Kelantan NDR for the year 2022, of which, 825 patient datasets fulfilled the study criteria and were included in the study. Descriptive and multiple logistic regression analysis were performed. The proportion of prehypertensive T2DM patients was 73.5% (606 patients) with a mean (SD) age of 55.8 (11.30) years old, majority being the female patients at 402 patients (66.3%) and of Malay ethnicity at 585 (96.5%) patients. Only 41 (6.8%) patients were smoker while 330 (54.5%) patients had dyslipidaemia. Majority of patients were overweight [254 (41.9%) patients] and obese [215 (35.5%) patients] with 370 (61.1%) patients having abnormal waist circumference. The mean (SD) of HbA1c level was 8.31% (2.21) while 87 (14.4%) patients experienced microalbuminuria. Significant association with prehypertension was found for age (aOR 1.02; 95% CI: 1.00, 1.03;  $p = 0.012$ ), sex (aOR 1.54; 95% CI: 1.10, 2.15;  $p = 0.013$ ) and smoking (aOR 2.19; 95% CI: 1.02, 4.73;  $p = 0.045$ ).

**Conclusion:** There was a high proportion of prehypertension among T2DM patients in Kelantan in the year 2022. Besides non-modifiable factors age and sex, smoking was significantly associated with prehypertension among T2DM patients thus highlighting the importance of

smoking cessation promotion for T2DM patients to prevent the development of prehypertension.

*Supervisor*

Associate Professor Dr. Nor Azwany binti Yaacob

## POOR SLEEP QUALITY AND ITS ASSOCIATED FACTORS AMONG NURSES IN TERTIARY HOSPITALS IN KELANTAN

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**Introduction:** Nurses, with other healthcare workers, provide crucial functions in patient care and the healthcare system. Understanding the significance of good sleep quality will help to improve quality of healthcare services and enhance patient safety.

**Objectives:** The purpose of this study was to determine poor sleep quality and its associated factors among nurses in tertiary hospitals in Kelantan.

**Materials and Methods:** This cross-sectional study examines nurses from two tertiary hospitals in Kelantan, Malaysia. The nurses were proportionately and randomly selected from the hospitals and included in the study. The nurses worked in tertiary hospitals and had at least two months of working experience in current department. The study used self-administered questionnaire with 19 items in seven component scores. The data were analysed using SPSS version 28 and logistic regression analyses were used to identify the associated factors.

**Results:** A total of 470 nurses participated in this study. The results indicate that prevalence of poor sleep quality among nurses was 69.8%. The study identifies the sleep duration (aOR 0.291; 95% CI: 0.215, 0.393;  $p < 0.001$ ), working experience (aOR 0.953; 95% CI: 0.924, 0.984;  $p = 0.003$ ), history of involvement in medication error (aOR 2.669; 95% CI: 1.413, 5.041;  $p = 0.002$ ) and commuting injury (aOR 1.869; 95% CI: 1.119, 3.121;  $p = 0.017$ ) as the significant associated factors.

**Conclusion:** The study found that nurses generally had poor sleep quality with some significant associated factors. To improve sleep quality among nurses, ongoing education and establishing a nurturing work environment are important.

*Supervisor:*

Associate Professor Dr. Mohd Ismail bin Ibrahim

## SURVIVAL RATE AND PROGNOSTIC FACTORS OF DEATH AMONG PATIENTS WITH NON-HODGKIN LYMPHOMA IN KELANTAN FROM 2008-2017

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**Introduction:** Non-Hodgkin lymphoma is the 12th most common cancer globally, the 4th in Malaysia, and the 5th in Kelantan. Studying the survival rate, median survival time, and prognostic factors of non-Hodgkin Lymphoma can provide valuable insights specific to the Kelantan population and assist in developing better intervention programmes. Improving the survival rate aligns with Sustainable Development Goal 3.0, which aims to ensure healthy lives and promote well-being.

**Objectives:** This study aimed to describe Kelantan's non-Hodgkin lymphoma survival rate and median survival time. This study also aimed to determine the prognostic factors for death among non-Hodgkin lymphoma patients in Kelantan.

**Materials and Method:** A retrospective record review was conducted using secondary data among the patients diagnosed with non-Hodgkin Lymphoma from January 1, 2008, until December 31, 2017. An additional five-year follow-up until December 31, 2022, was done to verify the patient's status. The inclusion criteria included Malaysian patients aged 15 years or older with Hodgkin lymphoma who resided and registered in the Kelantan Cancer Registry between January 1, 2008, and December 31, 2017. The exclusion criteria included missing data greater than 30% and duplicate data. All patients who fulfilled the inclusion and exclusion criteria were included in the study. The data were analysed using SPSS version 28. Kaplan-Meier was used to calculate survival estimates, while the Cox proportional hazards model was used to determine prognostic factors.

**Results:** There were 448 patients included in this analysis. The mean (SD) age at diagnosis was 50.19 (18.01). Most patients were male, 60.7% and Malay 96.4%. The most common histological subtypes were Mature B-cell neoplasm (74.3%) and the aggressive type (87.3%). The 5-year overall survival rate was 28.3% (95% CI: 24.1, 32.5). The median survival time of  $\geq 15$ -year-old non-Hodgkin lymphoma patients in Kelantan was 9.01 (95% CI: 5.95, 12.06) months, respectively. The proportional Hazard Cox model showed that age more than 60 years old had a higher hazard of death of 1.55 (Adj. HR: 1.55; 95% CI: 1.24, 1.93;  $p = < 0.001$ ) times compared to age less 60 years old; being male had a higher hazard ratio of death of 1.39 (Adj. HR: 1.39; 95% CI: 1.12, 1.73;  $p = 0.003$ ) times compared to female; and being in stage IV had a higher hazard ratio of death of 1.88 (Adj. HR: 1.88; 95% CI: 1.17, 3.04;  $p = 0.010$ ) times compared to stages I and II. When other variables were adjusted, the patient who did not undergo chemotherapy treatment had a significantly higher hazard of death of 1.50 (Adj. HR: 1.50; 95% CI: 1.18, 1.92;  $p = 0.001$ ) times compared to the patient who received chemotherapy.

**Conclusion:** The overall 5-year survival rate was 28.3% (95% CI: 24.1, 32.5). The median survival time of  $\geq 15$ -year-old non-Hodgkin lymphoma patients in Kelantan was 9.01 (95% CI: 5.95, 12.06) months. The significant factors of death among non-Hodgkin lymphoma patients in Kelantan were age  $\geq 60$ , male gender, stage IV, and patients who did not receive chemotherapy treatment, which was consistent with other studies globally. This study provides essential data for policymakers to design targeted health interventions, such as early detection and treatment programmes, to increase

survival rates, reduce non-Hodgkin lymphoma mortality, and improve Kelantan's blood cancer care services.

*Supervisor:*

*Dr. Suhaily binti Mohd Hairon*

## **FACTORS ASSOCIATED WITH UNDIAGNOSED DIABETES MELLITUS AMONG THE PEKA B40 POPULATION ON LANGKAWI ISLAND FROM 2022 TO 2023**

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**Introduction:** The prevalence of undiagnosed DM poses a significant public health challenge, particularly among socio-economically disadvantaged populations. This study aims to evaluate the prevalence and factors associated with undiagnosed DM among the PeKa B40 population on Langkawi Island, Malaysia.

**Objectives:** This study aims to estimate the prevalence and determine the associated factors of undiagnosed DM among PeKa B40 population on Langkawi Island from 2022 to 2023.

**Materials and Methods:** A retrospective cross-sectional study was conducted using secondary data records from January 2022 to December 2023, involving 1,070 participants from the PeKa B40 population on Langkawi Island. No sampling method was used as all cases are included. Descriptive statistics were used to summarise the data, and multiple logistic regression analyses were performed to identify factors associated with undiagnosed DM.

**Results:** The prevalence of undiagnosed DM was found to be 6.7% among the study population. Key factors associated with undiagnosed DM included medical history, higher BMI, and residing on smaller islands. Participants classified as overweight and obese were significantly more likely to have undiagnosed DM compared to those with a normal BMI (Adj. OR: 2.72, 95% CI: 1.40, 5.30,  $p = 0.003$ ) for overweight; (Adj. OR: 2.43, 95% CI: 1.19, 5.00,  $p = 0.015$ ) for obese. Individuals residing on smaller islands had a higher likelihood of undiagnosed DM compared to those on the main island (Adj. OR: 1.71, 95% CI: 1.03, 2.85,  $p = 0.039$ ). Participants with a documented medical history were significantly less likely to have undiagnosed DM (Adj. OR: 0.21, 95% CI: 0.12, 0.36,  $p < 0.001$ ).

**Conclusion:** Our study reveals 6.7% prevalence of undiagnosed diabetes mellitus among the PeKa B40 population in Langkawi Island. We identified existing medical history, higher body mass index (BMI) and resident at small islands as associated factors for undiagnosed DM among the PeKa B40 population in Langkawi Island. The high prevalence of undiagnosed DM among the PeKa B40 population underscores the urgent need for enhanced screening and early detection programmes. Public health strategies should focus on targeted education campaigns, expanding healthcare infrastructure, and integrating opportunistic screening into

routine healthcare interactions to improve early detection and management of DM.

Supervisor:

Dr. Afiq Izzudin bin A. Rahim

## FACTORS ASSOCIATED WITH SEVERE ZONOTIC MALARIA INFECTION IN PAHANG FROM 2011 UNTIL 2022

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**Introduction:** Malaria remains a global public health challenge, with zoonotic malaria caused by the Plasmodium knowlesi parasite posing a significant threat in Southeast Asia, particularly in Malaysia. Severe zoonotic malaria, a disease stage characterised by life-threatening complications, is a major concern. This study aims to determine the proportion and factors associated with severe zoonotic malaria infection in Pahang, Malaysia, from 2011 to 2022.

**Objective:** The study aimed to describe sociodemographic characteristics, to determine proportion, and associated factors of severe zoonotic malaria infection in Pahang.

**Materials and Methods:** This cross-sectional study utilised secondary data from the VEKPRO malaria database, including 487 zoonotic malaria cases reported in Pahang between 2011 and 2022. Descriptive statistics were employed to determine the proportion of severe cases of zoonotic malaria, while multiple logistic regression identified factors associated with severe infection of zoonotic malaria.

**Results:** Among the 487 cases analysed, 97 (19.9%) were classified as severe zoonotic malaria infections, and 390 (80.1%) were uncomplicated. Key factors significantly associated with severe infection included age, occupation, and delay in diagnosis. Individuals over 60 years old had a significantly higher risk of severe infection (Adjusted OR: 18.49, 95% CI: 2.17–157.59) compared to those under 15. Forest-related occupations were also a significant risk factor (Adjusted OR: 2.21, 95% CI: 1.32–3.71) compared to non-forest-related jobs. Additionally, a diagnosis delay of more than 4 days substantially increased the risk of severe zoonotic malaria (Adjusted OR: 5.18, 95% CI: 2.65–10.14).

**Conclusion:** The high proportion of severe zoonotic malaria cases in Pahang underscores significant public health concerns. Critical risk factors such as older age, forest-related occupations, and delayed diagnosis require targeted public health interventions. Enhancing diagnostic facilities and ensuring prompt healthcare access, especially in rural areas, are crucial to reducing the severity of zoonotic malaria.

Supervisor

Dr. Noor Aman A. Hamid

## SURGICALLY TREATED INTRACRANIAL HAEMORRHAGE AMONG HOSPITALISED-PATIENT WITH COVID-19 AND NON-COVID-19 DURING PANDEMIC ERA AND ITS ASSOCIATED FACTORS IN HOSPITAL SUNGAI BULOH: A RETROSPECTIVE OBSERVATIONAL STUDY

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**Introduction:** Neurosurgery has been involved in managing primary intracranial haemorrhage complications, whose etiologies are well-known. Primary intracranial haemorrhage may be associated with the COVID-19 infection. COVID-19 was thought to have a higher risk of ICH due to the neurological manifestation of the disease. We aim to study the demographics, comorbidities, risk factors, association, and comparison of outcomes between surgically treated ICH and non-COVID-19 patients.

**Objectives:** To study the association and compare outcomes between surgically treated primary intracranial haemorrhage and COVID-19.

**Materials and Methods:** A total of 162 primary intracranial haemorrhage patients who have been surgically treated were collected retrospectively; 72 of them were COVID-19 positive using RT-PCR tests and CT values for each patient recorded. The demographics, co-morbidities, anticoagulant usage, radiological subtypes, ICH score, the severity of COVID-19, ICU admissions, mortality within thirty days, the functional outcome of the Modified Rankin Score (mRS score), and length of hospital stays were studied. The association and comparison of outcomes between COVID-19 and non-COVID-19 patients were analysed. Univariate logistic and linear regressions, as well as multivariate logistic and linear regressions, were used for the analysis of the association of factors influencing outcomes of mortality and functional outcome, respectively, among surgically treated primary ICH patients with COVID-19.

**Results:** Out of 162 patients, 72 COVID-19 patients, 87.5% and 59.7% were hypertensive and diabetic, and 86.7% had basal ganglia haemorrhage. Mortality among COVID-19 patients was 38.9%. ( $P = 0.720$ ). The median length of stay was 28 days, and 84.7% of them required ICU admissions. ( $P = 0.028$ ). The mean ICH score for both COVID-19 and non-COVID-19 groups was 3, and the median Modified Rankin Score (mRS) was 4. There was no statistically significant association between mortality and the groups of patients (COVID-19 and non-COVID-19) among anticoagulant usage ( $P = 0.765$ ). ICH scoring was a significant variable for both univariate logistic regression and linear regression analysis for mortality and mRS scores with ( $P < 0.05$ ). Final multivariate logistic regression analysis revealed higher ICH scoring associated with higher mortality (Adjusted OR = 7.888; 95% CI: 2.322, 26.790;  $P = 0.001$ ). In addition, multivariate linear regression analysis reported increasing ICH scoring, and those with hypertension are significantly associated with an increased mRS score among COVID-19 patients who underwent surgical intervention for intracerebral haemorrhage. (Adjusted  $b = 1.027$ , 95% CI:

0.550;  $P < 0.001$ ) and (Adjusted  $b = 1.409$ , 95% CI: 0.499, 2.320;  $P = 0.003$ ). The mean ICH score for the group of CT values (CT values  $< 20$  vs.  $\geq 20$ ) was 3 and significantly increased mortality as the ICH score increases ( $P = 0.027$ ,  $P = 0.012$ ).

**Conclusion:** In conclusion, there is no difference in terms of mortality rate and functional outcome among surgically treated primary ICH patients with COVID-19 when compared with patients without COVID-19. There was also no association between mortality rate and anticoagulant usage in both groups. However, surgically treated primary ICH patients with COVID-19 had a higher ICH score associated with a higher mortality rate. In addition, surgically treated primary ICH patients with COVID-19 have a higher ICH score, and patients with comorbid hypertension have worse functional outcomes (mRS scores). CT values of COVID-19 infectivity have poor value in predicting outcome in COVID-19 patients with primary ICH.

*Supervisor:*  
Professor Dr. Zamzuri Idris

*Co-supervisor:*  
Dr. Saiful Azli bin Mat Nayan

## **COST-EFFECTIVENESS ANALYSIS OF DEEP BRAIN STIMULATION SURGERY FOR PARKINSON'S DISEASE PATIENT IN HOSPITAL USM**

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**Introduction:** Deep Brain Stimulation (DBS) reduces the disease burden on patients and improves their quality of life but its cost is significantly higher than maximal medical therapy due to expenses related to equipment, surgery, and follow-up. Various economic models have demonstrated its cost-effectiveness in countries with high-income economies. These findings have not been validated for middle-income countries like Malaysia.

**Objective:** The question arises whether DBS surgery is more cost-effective than the best available medical therapy for treating Parkinson's disease patients at HUSM (Hospital Universiti Sains Malaysia), despite its high cost in Malaysia.

**Methodology:** This study is a comparative cost analysis that utilised a retrospective case-control design and secondary data review. The study focused on advanced stage Parkinson's disease patients who received either Deep Brain Stimulation (DBS) or Best Medical Therapy (BMT) between 2015 and 2021.

**Results:** DBS surgery leads to a significant improvement in the outcomes of PD patients but with increased cost. After one year of DBS treatment for PD patients, an average investment of RM5,063.55 was needed to improve the UPDRS-III OFF score by one point when comparing to patients without receiving medication but increases to RM30,206.70 to achieve a one-point improvement during the patient's ON-time, when compared to PD patients

receiving medication. This is cost-effective for the country as it is lower than the Malaysian GDP per capita, but not cost-effective for patients living in the Kelantan state in Malaysia, as the state GDP per capita is lower than the calculated cost-effectiveness ratio.

**Conclusion:** DBS intervention is cost-effective in our country, indicating progress towards providing a level of care similar to more developed countries. Further studies should be conducted using different methodologies such as economic models and prospective assessments of patient Quality-of-Life. These studies can provide additional support for the cost-effectiveness of DBS intervention. Due to its high cost, additional funding would be required from the government, and patients and their families would need to be willing to pay for the treatment.

*Supervisor:*  
Professor Dato' Dr. Ab Rahman Izaini Ghani

*Co-supervisors:*  
Mr. Noor Azman bin A Rahman@Mohd  
Associate Professor Dr. Sanisah Abdul Halim  
Associate Professor Rosminah Mohamed

## **SEGMENTAL PEDICLE SCREW ACCURACY AND SAFETY AGAINST THE IGS REFERENCE ARRAY POSITION USING INTRAOPERATIVE CT SCAN IMAGINGS**

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**Introduction:** Pedicle screw fixation was a commonly used method for stabilising the spine and providing 3-column support. The emergence of image-guided surgery (IGS) has revolutionised spinal surgery, allowing surgeons to perform procedures with greater accuracy and safety. One of the key components of IGS systems is the use of reference arrays (RA) and image-based navigation to guide screw placement.

**Objectives:** The aim of this study was to investigate the relationship between pedicle screw placement accuracy and the distance from the IGS reference array.

**Materials and Methods:** A total of 93 pedicle screws (18 cervical, 49 thoracic, and 26 lumbar) were inserted in 21 patients at Hospital Umum Sarawak between October 2017 and July 2022. The accuracy of screw placement was evaluated using post-operative CT scans. The screws were rated on the Gertzbein-Robbins (GR) classification scale, which assigned Grades 0-3 (Grade 0: Screw within pedicle, Grade 1:  $\leq 2$  mm breach, Grade 2:  $> 2-4$  mm breach, Grade 3:  $> 4$  mm breach). The pedicle screw placement was further divided into "Satisfactory Placement" (Grade 0-1) and "Unsatisfactory Placement" (Grade 2-3).

**Results:** The accuracy of screw placement was satisfactory ( $\leq 2$  mm) in 80.6% of all segments. The distance from the RA up to four segments did not significantly affect screw accuracy when using IGS guidance. Only one patient experienced a complication, which was a CSF leak likely due to a dural tear during pedicle screw fixation.

**Conclusion:** The results suggested that the distance from the reference array did not significantly affect screw accuracy within the studied range (up to four segments). IGS-guided pedicle screw insertion was a valuable technique for improving accuracy and safety in spinal fusion surgery.

*Supervisor:*

*Professor Dato' Dr. Abdul Rahman Izaini Ghani*

## APPLICATION OF ARTIFICIAL INTELLIGENCE (AI) IN MEASURING VOLUME OF BASAL GANGLIA BLEED

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**Introduction:** Basal ganglia bleed had been around in medical community due to the consequence of uncontrol hypertension. Due to the recent years, the demographic age of patient had been shifted to much younger as compared to previous years of study. In the incremental number of patient having this complication of hypertension, it had been a subject of debate amongst the practitioner for the volume of clots that were taken into account as it plays an important indication whether patient would be subjected for surgical evacuation or as total medical treatment. For the past years, it had been advocated to use the formula of ABC/2 as an elliptical volume formula to calculate the volume of basal ganglia bleed. In recent advancement of technology and artificial intelligence, there are more predicted to be more accurate measurement of volume with their aid and aim to decrease the amount of time needed for a practitioner to calculate the volume and to come out with the management for the patient.

**Objectives:** To compare the accuracy of volume measurement for intracranial bleed with comparison of using ABC/2 method with planimetry method, and 3d interpolation method. To determine the more accurate volume measurement for intracranial bleed with using other adjuncts. To be able to make more accurate management for patients with intracranial bleeding with aids.

**Materials and Methods:** A prospective study been held in Hospital Universiti Sains Malaysia. 82 patient whom suffered spontaneous intracerebral haemorrhage located at the basal ganglia and referred to neurosurgery department were recruited. The DICOM images of CT brain were obtained from the radiology server and run in MITK workbench tool for the planimetry method and 3d interpolation method. The images were also use for the traditional method of calculating basal ganglia bleed (ABC/2) method. All results were collected and comparison were made to see the accuracy of all method in comparison.

**Results:** There was no significant median difference ( $p > 0.05$ ) for volume measurement of basal ganglia bleed using the ABC/2 method and planimetry method.

**Conclusion:** The traditional ABC/2 method is still reliable in calculating the volume of basal clot as compared to assistance of the artificial intelligence (in this case MITK tool). The traditional method also seems to be accurate,

less time needed to calculate the volume as compared to the planimetry method. The difference seen mostly in irregular clot that appears on CT images where the volume seen more accurate to be measured by planimetry as compared to the traditional method.

*Supervisors:*

*Dr. Saiful Azli bin Mat Nayan (KKM)*

*Professor Dr. Zamzuri bin Idris (USM)*

*Co-supervisor:*

*Dr. Johari Abdullah (USM)*

## MODIFIED RAPID EMERGENCY MEDICINE SCORE (mREMS): PREDICTING MORTALITY AND OUTCOME IN ISOLATED ADULT TRAUMATIC BRAIN INJURY

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**Introduction:** There is no reliable scale for rapid prediction of mortality or outcome following head trauma. Physiology factors such as age, vital signs, level of consciousness, arterial oxygen saturation level are variables routinely evaluated in ED, were incorporated as mREMS-TBI scoring tool.

**Objectives:** Our objective was to validate mREMS scoring system for predicting in-hospital mortality and its association with GOS outcome.

**Materials and Methods:** Between January 2015 till December 2019, isolated adult TBI patient were studied retrospectively. Patient's case records were tracked. A total of 940 patients were identified.

**Results:** A total of 940 isolated TBI patients were enrolled in this study from age of 12 to 80 years (mean age 50 years); predominantly male ( $N = 501$ , 53.3%). Among 940 population, Bumiputera Sabah was the highest ethnic ( $N = 318$ , 33.8%) and commonest mechanism of injury was blunt trauma ( $N = 776$ , 82.6%). In this study, severe TBI GCS group ( $N = 319$ , 33.9%) came highest together with favourable GOS outcome group. There was no association between GCS severity and mREMS. Higher mREMS associated with mortality (Median score of 22) and lower scoring shown favourable GOS outcome (Median score of 6). A significant prediction regression analysis was found among outcomes (OR: 1.15 (95% CI: 1.116; 1.185),  $p < 0.001$ ).

**Conclusion:** In this study, mREMS-TBI was proven predictor of in-hospital mortality, may hold value in the pre-hospital and emergency department setting to improvise GOS outcome upon discharge.

*Supervisor:*

*Dr. Mohd Sofan Zenian*

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## COMPARING ENDOSCOPIC LAVAGE WITH CONVENTIONAL MANAGEMENT ALONE IN THE MANAGEMENT OF PAEDIATRIC VENTRICULITIS IN HOSPITAL KUALA LUMPUR AND HOSPITAL TUNKU AZIZAH: A RETROSPECTIVE STUDY

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**Introduction:** Ventriculitis is the inflammation of ependymal lining of the cerebral ventricles which comes with serious morbidity and mortality. Commonest causes of ventriculitis are meningitis, head trauma, cerebral abscess, complications of cranial surgery and placement of intracranial devices. The standard conventional treatment of ventriculitis are intravenous (IV) antibiotic, continuous drainage of CSF with external ventricular drainage (EVD). On the other hand, the endoscopic lavage (EL) is a feasible technique that allows neurosurgeon to effectively cleanse every corner of ventricle under direct vision and completely drains the infected CSF. The aim of this study is to compare the outcomes of paediatric patients with ventriculitis treated with EL and conventional management versus conventional management alone.

**Objectives:** To describe the outcome of all paediatric ventriculitis patients treated in Hospital Tunku Azizah and Hospital Kuala Lumpur, and to compare the functional outcome, mortality rate, time needed for CSF sterilisation, commonest organism and antibiotic duration in EL with conventional management and conventional management alone group.

**Materials and Methods:** This is a retrospective review of records study. The data is acquired from Hospital Information System (HIS) and case notes of all paediatric patients (less than 18 years) treated for ventriculitis either with EL and conventional management or conventional management alone from 1 January 2017–31 December 2021. The patients' clinical condition was assessed using GOS and mRS upon discharge and at 3 months from the date of treatment. A total of 91 patients were recruited in this study, where 43 underwent EL with conventional management and 48 underwent conventional management alone.

**Results:** Mortality rate was 0% (0/43) in EL group meanwhile 18.8% (9/48) in conventional group. Nine patients from conventional group passed away due to ventriculitis. The Glasgow Outcome Score (GOS) at discharge and three months follow-up for both groups showed an improving trend, with EL group had higher mean score (mean = 1.40, SD = 0.58) than the conventional group (mean = 0.81, SD = 1.09). Mean duration of CSF sterilisation showed that EL group had significant shorter duration (mean = 4.23, SD = 3.80) than the conventional group (mean = 15.73, SD = 13.87), with  $p < 0.001$  which is statistically significant. On the other hand, patients in EL group were 19 times more likely to survive than the conventional group (OR: 19.7; p-value 0.91).

**Conclusion:** In recent years, EL has emerged as a potential adjunctive therapy for paediatric ventriculitis. Our study has shown that between 2017 and 2021, the mortality

was 0% in the EL group and 18.8% in the conventional group. Functional outcome of EL were also significantly better than the conventional management based on improvement of the GOS and mRS score. EL has faster CSF sterilisation duration than conventional. EL group has better survival outcome rather than conventional group.

*Supervisors:*

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*Co-supervisors:*

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## CLINICAL OUTCOMES IN TRANSSPHEOIDAL SURGERY FOR PITUITARY NEUROENDOCRINE TUMOUR IN SARAWAK GENERAL HOSPITAL: MICROSCOPIC VERSUS ENDOSCOPIC APPROACH

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**Introduction:** Pituitary adenoma was recently renamed to the pituitary neuroendocrine tumour (PitNET), and transsphenoidal surgery is one of the approaches that provide direct access to this tumour. Outcomes for transsphenoidal surgical resection of PitNET were heterogeneous.

**Objectives:** This work aimed to develop local data for the outcomes of transsphenoidal surgery, either via a microscopic or endoscopic approach in PitNET.

**Materials and Methods:** We performed a retrospective review of patients with PitNET treated by transsphenoidal surgery at Sarawak General Hospital from 2014–2021. We included only cases treated by senior author to avoid performance bias. Collected data included demographic, clinical, radiologic, operative, and outcome.

**Results:** There were 60 patients, including 35 patients in the microscopic group and 25 in the endoscopic group. The baseline characteristic of the two groups was comparable. The rate of gross total resection is similar (34.4% vs. 44.0%,  $p = 0.459$ ) in both approaches. The endoscopic approach was observed to have a higher proportion of patients with arachnoid breach than the microscopic approach ( $p = 0.010$ ). However, the endoscopic approach had a significantly higher proportion of patients with improved anterior pituitary gland function than the microscopic approach ( $p = 0.006$ ). Low morbidity with meningitis risk of 2.9% in the microscopic approach vs. 4.0% in the endoscopic approach ( $p > 0.950$ ). There was no mortality observed in our study. During follow-up, we found that 83% of patients with residual volume remained radiologically stable and clinically asymptomatic and did not require a second surgery.

**Conclusion:** Our study showed that transsphenoidal surgery, either microscopic or endoscopic approach, was safe for the resection of PitNET. The endoscopic approach has a

better outcome in anterior pituitary function improvement. There was no difference in the extent of resection and visual improvement. Post-operative meningitis risk is equally low. No mortality in our transsphenoidal series.

*Supervisor:*

*Professor Dato' Dr. Jafri Malin Abdullah*

*Co-supervisor:*

*Dr. Albert Wong Sii Hieng*

## PREDICTING EFFICACY OF VAGAL NERVE STIMULATION (VNS) SURGERY AMONG MEDICALLY REFRACTORY PAEDIATRIC EPILEPSY PATIENTS: A COHORT OBSERVATIONAL STUDY

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**Background:** Vagus Nerve Stimulation (VNS) surgery has increasingly been considered a therapeutic approach for children with drug resistant epilepsy (DRE). We describe a one-centre experience of VNS implantation in paediatric patients with epileptic encephalopathy with the aim to demonstrate VNS efficacy and to investigate potential predictive factors.

**Methods:** This is a cohort observational study. 28 paediatric patients who underwent VNS surgery in Hospital Tunku Azizah (HTA) from July 2018 to December 2021 were identified and were followed up for 18 months. Primary outcome measure was reduction in seizure frequency whereby the favourable outcome is reduction > 50%, labelled as 'responder'. Secondary outcome measure is assessed by McHugh classification post-operatively, improvement in seizure severity and effect on number of antiepileptic drugs (AEDs) and hospitalisations. Third outcome is measurement of quality of life (QoL) of patient by the Paediatric Quality of Life (PedsQL™) questionnaire and QoL of carer via Caregiver Strain Index (CSI) scale.

**Results:** 28 patients met the inclusion criteria with average age at seizure onset being 3 years and 5.2 months. Seizure frequency was reduced by more than 50% in 44.7% of patient at 6 months follow-up and 57.1% at 18 months follow-up. There was improvement of seizure severity, number of AEDs and number of hospitalisations post-operatively. Out of 1- predictive factors investigated, age at seizure onset ( $\geq 3$  years old) ( $t = 0.008$ ) and age at VNS implantation ( $< 5$  years old) ( $t = 0.035$ ) were correlated with responders ( $t < 0.05$ ) in univariate and multivariate analysis. With regards to seizure outcome, 23 patients that had earlier VNS implantation ( $< 5$  years old) had good outcome based on McHugh classification (Class II and III). These patients also show improvement in (PedsQL™) score ( $t < 0.001$ ) and reduction in CSI score ( $t < 0.001$ ). It can be concluded that there is a degree of improvement of QoL post-operatively for both patient and carer.

**Conclusion:** VNS is promising treatment option for children with DRE displayed by overall seizure reduction

over 18 months. Younger age at implantation ( $< 5$  years) and seizure onset age  $> 3$  years old was two predictors of favourable clinical outcome in patients with epileptic encephalopathy. Lastly, there is improvement of QoL for both patient and carer after surgery. These 3 positive outcomes along with low incidence of adverse events makes it a suitable option despite its high cost.

*Supervisor:*

*Professor Dato' Dr. Abdul Rahman Izaini Ghani*

## MACOWS: MALAYSIAN ANATOMICAL CIRCLE OF WILLIS STUDY BASED ON MAGNETIC RESONANCE ANGIOGRAPHY

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**Introduction:** The Circle of Willis (CoW) is an important anastomotic pathway which provides collateral blood flow to the brain during occlusion of part of the circle. The CoW is a common site for numerous pathologies such as stenosis, aneurysms, embolic occlusion, vasculitis and dolichoectasia. Three-dimensional Time-of-Flight Magnetic Resonance Angiography (3D TOF-MRA) is a well-established tool to visualise intracranial blood vessels and diagnose any potential anomalies or irregularities.

**Objectives:** We aim to establish the normal reference values for the diameters of seven major arteries in the CoW, utilising 3-Dimensional Time-of-Flight Magnetic Resonance Angiography (3D TOF-MRA) in a Malaysian population.

**Materials and Methods:** We retrospectively reviewed imaging records of patients who underwent brain MRI and MRA studies at Sarawak General Hospital between March 2020 and June 2021. A total of 100 MRA studies were reviewed, where the diameters of all major CoW arteries were measured at defined locations. The primary objective was to establish a reference range of measurements for all major CoW arteries for a Malaysian population of patients presenting for brain magnetic resonance imaging (MRI) and magnetic resonance angiography (MRA). The correlation between the vessel diameters in relation to gender, age, ethnicity, cranial side, disease state and MRI findings were evaluated.

**Results:** The diameters of all major CoW arteries were measured at defined sites. The mean diameters and standard deviations (SD) were as follows: right internal carotid artery, 2.96 mm (SD 0.10); left internal carotid artery, 2.94 mm (SD 0.11); M1 segment of the right middle cerebral artery, 2.06 mm (SD 0.09); M1 segment of the left middle cerebral artery, 1.96 mm (SD 0.07); A1 segment of the right anterior cerebral artery, 1.58 mm (SD 0.06); A1 segment of the left anterior cerebral artery, 1.56 mm (SD 0.08); anterior communicating artery, 1.22 mm (SD 0.06); basilar artery 2.57 mm (SD 0.05); P1 segment of the right posterior cerebral artery, 1.51 mm (SD 0.07); P1 segment of the left posterior cerebral artery, 1.59 mm (SD 0.73); right posterior communicating artery, 1.33 mm (SD 0.05); and left posterior communicating artery, 1.20 mm (SD 0.05). All our patients

had vessels of comparable calibre regardless of gender, age, ethnicity, disease status or MRI pathology.

**Conclusion:** In this study, we have established a reference range that is widely applicable as a baseline reference point and in the planning and design of future research studies. There was no association between vessel calibre with gender, age, ethnicity, disease status or MRI pathology.

*Supervisor:*  
Mr. Albert Wong Sii Hieng

### **VOLUMETRIC ANALYSIS OF TEMPORALIS MUSCLE POST FRONTOTEMPORAL CRANIOTOMY FOR CONVENTIONAL VS OSTEOMYOPLASTIC FLAP IN HOSPITAL SUNGAI BULOH, SELANGOR: A RETROSPECTIVE STUDY**

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**Introduction:** The incidence of brain tumours in Malaysia is 1.26 per 100,000 population/year. In adults, two thirds of primary brain tumours originate from structures above the tentorium cerebelli, hence collectively termed supratentorial tumours. Surgical resection remains the mainstay treatment for most intracranial tumours. Different surgical approaches (conventional or osteomyoplastic flap craniotomy) may result in a similar surgical outcome. Considering the good results in tumour resection, less attention has been directed to evaluate cosmetic side effects and masticatory impairment that may occur after craniotomy due to temporalis muscle atrophy. The osteomyoplastic flap craniotomy decreases the incidence of injury to the neurovascular structures supplying the temporalis muscle and the creation of subperiosteal tunnel provides less opportunity for damage to the temporalis muscle. This study was conducted to demonstrate objectively the degree of temporalis muscle atrophy post craniotomy for both methods of craniotomy.

**Objectives:** To compare the temporalis muscle volume post-surgery from both the conventional frontotemporal craniotomy and the osteomyoplastic flap craniotomy type approach in patients with supratentorial brain tumours.

**Materials and Methods:** This is a retrospective observational study of the type of craniotomy method used to approach supratentorial brain tumours in Hospital Sungai Buloh, Selangor. Data was emanated from the brain tumour registry census in the operation theatre and electronic hospital information system (eHIS) from 2019 to 2021. The information included demographics, grade of tumour and type of craniotomy. MRI images were obtained from the hospital PACS (by GE Healthcare) and the temporalis muscle volume was measured using HOROS open-source medical image viewer.

**Results:** A total of 50 patients were included in this retrospective study from 1st January 2019 until 31st December 2021. There were 25 patients included in each arm

(conventional and osteomyoplastic). The osteomyoplastic group showed lesser temporalis muscle volume loss of 3.70% compared to the conventional group which had a 14.85% volume loss compared to pre-operative state. There was a statistically significant difference of  $p < 0.001$ . This meant that the osteomyoplastic group proved to be a superior method for the outcomes compared to the conventional group.

*Supervisor:*  
Professor Dr. Abdul Rahman Izaini Ghani

*Co-supervisor:*  
Dr. Liew Boon Seng

### **THE OUTCOME OF MICROSCOPIC AND ENDOSCOPIC TRANSSPHEOIDAL SURGERY IN UNIVERSITI SAINS MALAYSIA**

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**Introduction:** Transsphenoidal surgery (TSS) is an increasing preferred treatment for sella lesions. In a university teaching hospital, the novel endoscopic TSS was adopted with ongoing resident teaching.

**Objectives:** We evaluated a single institutional series of preliminary comparisons of transseptal microscopic with endoscopic TSS.

**Materials and Methods:** A retrospective data analysis included 37 patients and 28 patients who underwent microscopic and endoscopic TSS, respectively. The demographic characteristics of the patients, intraoperative analyses, morbidity, mortality and visual assessments were included in this analysis.

**Results:** The study included 32 men and 33 women, and median age at surgery was 47 years old (range 14–70 years old;  $P = 0.435$ ). Overall, there is no differences between the pre-operative volumes between the microscopic and endoscopic group ( $P = 0.956$ ), respectively. However, there is a trend towards smaller post-operative volume in the microscopic groups as compared to the endoscopic group. The mean percentage of volume reduction was 79.0% through microscopic and 69.0% through endoscopic TSS ( $P = 0.108$ ). Complete resection was found in 30.6% through microscopic and 14.3% through endoscopic ( $P = 0.533$ ). There were no differences between the rates of cerebrospinal fluid (CSF) fistula, sinonasal complications, anterior pituitary hormone deficiency and respiratory event. Total length of stay and intensive care unit stay were similar between the groups. There is a significantly shorter procedure in the microscopic group as compared to the endoscopic group (216 min versus 299 min;  $P = 0.002$ ). Patients who underwent endoscopic TSS were at significantly increased risk of epistaxis ( $P = 0.002$ ), diabetes insipidus ( $P = 0.042$ ), CNS event ( $P = 0.032$ ) and post-operative visual deterioration prior to discharge ( $P = 0.001$ ).

**Conclusion:** Endoscopic TSS is a promising procedure that allows sufficient visualisation of the surgical field and adequate tumour removal. It is comparable to microscopic

TSS but has a higher complication rate notably due to steep learning curve required to gain the expertise.

Supervisor:

Professor Dr. Zamzuri Idris

## THE ASSOCIATION OF BODY MASS INDEX (BMI) AND GESTATIONAL DIABETES MELLITUS (GDM) IN HOSPITAL UNIVERSITI SAINS MALAYSIA (HUSM)

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**Introduction:** Gestational diabetes mellitus and obesity are independently associated with adverse maternal and neonatal outcomes.

**Objectives:** To study the association between BMI and GDM in HUSM and delivery outcomes.

**Materials and Methods:** We conducted a retrospective cross-sectional study of 464 patients delivered from 1st January 2017 to 31st December 2020 in HUSM. The patients aged less than 40 with singleton term pregnancy were grouped into six groups based on their booking BMI. Then they were further subcategorised into two subgroups; if they had GDM or no GDM. The demographic, maternal, and neonatal outcomes were collected for each subgroup. Those with pre-existing diabetes, overt diabetes, and instrumental delivery were excluded from the study.

**Results:** Prevalence of GDM based on maternal BMI was 42.11% in underweight, 34.20% in normal weight, 43.75% in overweight, 43.21% in obese class I, 52.17% in obese class II, and 25% in obese class III categories, respectively. There was no statistically significant difference between maternal outcomes between normal BMI (BMI 18.5–24.99 kg/m<sup>2</sup>) patients having GDM and excessive BMI (BMI ≥ 25 kg/m<sup>2</sup>) patients having GDM, including overweight and obese patients of all classes. There was a significant association between neonatal jaundice with the neonatal outcome of GDM in normal BMI and GDM with excessive BMI patients.

**Conclusion:** Obesity is likely associated with GDM. Optimisation of BMI prior to pregnancy will reduce the risk of GDM and associated complications.

## A REVIEW ON ULTRA-LONG PROTOCOL IN IVF CYCLES AMONG WOMEN WITH ENDOMETRIOSIS AT HOSPITAL SULTANAH BAHYAH

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**Introduction:** 30%–50% of women with endometriosis are associated with infertility. In-vitro fertilisation (IVF) has gradually become essential in enhancing their chance of pregnancy. The use of ultra-long protocol or prolonged GnRH agonist is introduced as a controlled ovarian hyperstimulation (COH) in this group of women.

**Objectives:** To determine the demographic data, embryo quality and cycle outcomes in women with endometriosis who receive ultra-long protocol in IVF cycles.

**Materials and Methods:** The medical notes of 165 women receiving ultra-long protocol from January 2015 until December 2020 were reviewed in this retrospective study. The comparison of sociodemographic and cycle characteristics in each stage of endometriosis was analysed using the Chi-square test. The association between the different stages of endometriosis and the quality of embryo and cycle outcomes was analysed using ANOVA and simple logistic regression.

**Results:** There was no significant difference in sociodemographic data and cycle characteristics between each stage of endometriosis. There was a significant difference between the total number of cleavage embryos ( $p = 0.016$ ) and good quality embryos ( $p = 0.003$ ) between stages of endometriosis. The fertilisation rate in this study was 75.61% (SD = 26.65), with overall clinical pregnancy and live birth rates of 28.4% and 23.9%. There was no significant association between stages of endometriosis with fertilisation rate, the quality of embryos, clinical pregnancy and live birth rate.

**Conclusion:** In this study, the outcomes of ultra-long protocol in IVF are similar in all stages of endometriosis. However, this protocol is still an option in managing women with endometriosis-associated infertility.

Supervisor:

Dr. Ahmad Amir Ismail

Co-supervisors:

Dr. Murizah binti Md Zain

Dato' Dr. Bavanandam Naidu

## THE IMPACT OF ENDOMETRIAL THICKNESS ON FROZEN EMBRYO TRANSFER – HORMONAL REPLACEMENT THERAPY CYCLE

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**Introduction:** Assisted Reproductive Techniques, namely In-Vitro Fertilisation (IVF) or Intracytoplasmic Sperm Injection (ICSI) has been widely accepted to be an effective treatment option for infertility. Frozen embryo transfer (FET) has become a popular option for assisted reproduction due its convenience, cost-effectiveness, and high success rates. Despite the achievement of these techniques, the success rate varies, depending on various factors; the cause of subfertility, embryo quality and



endometrial receptivity. Thin endometrium is known to be associated with impaired pregnancy outcomes in IVF/ICSI cycles. The role of thick endometrium, on the other hand, remains controversial. Moreover, there has been insufficient evidence of the range ET which is most suitable for embryo transfer. This study was performed to determine the best ET range which carries high potential for successful FET cycle

**Objectives:** We aimed to determine the effect of endometrial thickness and endometrial pattern on the outcome of FET-HRT cycles. Apart from that we also aimed to determine the implantation rate and pregnancy rate for successful implantation, the optimum endometrial response for successful implantation as well as to determine the associated factors influencing endometrial thickness in a successful FET-HRT cycle

**Materials and Methods:** the medical notes of 337 patients who underwent their first FET-HRT cycles over 36 months were reviewed in this retrospective study. The optimum ET for a successful cycle was determined using ROC curve. All patient were divided into two groups according to their ET one day before embryo transfer (Group A  $\geq 9.0$  mm and Group B  $< 9.0$  mm), where the pregnancy outcomes and factors associated with pregnancy were compared using chi-square test and multivariate logistic regression test.

**Results:** a total of 98 patients managed to conceive, giving rise to a pregnancy rate of 29.1%. from the ROC curve, ET was a good predictor for a successful cycle (AUC = 0.768). an ET of 9.05 mm, rounded to 9.0 mm, had 93.9% sensitivity and 55.9% specificity to predict a successful cycle. Comparing the patients in the two groups, patient in group A had a significantly higher clinical pregnancy rate in comparison with group B (28.36% and 0.90% respectively,  $p < 0.001$ ). this comparison remained significant even after adjustment with age and number of transferred embryos.

**Conclusion:** Endometrial thickness one day prior to embryo transfer in FET-HRT cycles significantly affects pregnancy outcomes, independent of other factors.

*Supervisor:*

*Associate Professor Dr. Adibah Ibrahim*

*Co-supervisor:*

*Dr. Nasuha Yaacob*

## AN AUDIT OF CAESAREAN AN AUDIT OF CAESAREAN SECTION RATE AT HOSPITAL UNIVERSITI SAINS MALAYSIA FROM JANUARY UNTIL DECEMBER 2019 USING ROBSON TEN-GROUP CLASSIFICATION SYSTEM (TGCS)

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**Introduction:** Caesarean delivery can effectively prevent maternal and perinatal mortality and morbidity if it is medically indicated. In Malaysian public hospitals, the CS rate is constantly increasing for the past two decades. WHO

proposed the use of Robson TGCS to compare the caesarean section rates across different places and populations, and also help in implementation and evaluation of interventions targeted to a specific Robson's group.

**Objective:** To review the CS rate using Robson TGCS by estimating the overall and specific CS rate in each group of women and also to describe characteristic and management of particular TGCS group.

**Materials and Method:** This retrospective study involved all parturients who attended labour ward and antenatal ward Hospital USM. All parturients were divided into ten different totally inclusive and mutually exclusive groups according to six different clinical parameters which includes; 1) parity, 2) history of previous caesarean section, 3) number of fetus in current pregnancy, 4) gestational age, 5) the onset of labour, and 6) fetal lie and presentation. Sociodemographic data and other data including the six clinical parameters were obtained from registry book in labour ward and the case file traced from the record office Hospital USM. Descriptive statistics were used to summarise the sociodemographic characteristics of subjects. Numerical data was presented as mean (SD) or median (IQR) based on their normality distribution. Categorical data was presented as frequency (percentage).

**Results:** A total of 7320 parturients records were obtained from labour ward registry book and the case file traced from the record office. Of these there were 1429 CS (with total CS rate of 19.5%) in 2019. More than half of CS were performed for obstetric indication, followed by fetal indication (29.5%) and maternal indication (18.3%). We noted that Group 9, Group 3 and Group 5 were the major contributor to overall CS rate (29.7%, 18%, 13.8%, respectively). The CS rate in Group 5.1(term, singleton, cephalic presentation, multiparous women with one previous CS) was 13.4%, which indicates appropriate selection of women for trial of labour after CS (TOLAC).

**Conclusion:** In our study, the highest-risk groups for CS were different from other institution; possibly due to different group size. Among women with one previous CS, judicious patient selection may help to reduce the CS rate. The standardised use of CS classification, especially Robson TGCS, in all Ministry of Health hospitals allow us to audit and compare across different institution.

*Supervisor:*

*Associate Professor Dr. Mohd Pazudin bin Ismail*

*Co-supervisors:*

*Associate Professor Dr. Adibah binti Ibrahim*

*Dr. Erinna binti Mohamed Zon*

## A RETROSPECTIVE REVIEW ON READMISSION FOR POST-CAESAREAN SECTION (CS) PATIENT WITH SURGICAL SITE INFECTION (SSI) AT HOSPITAL RAJA PERMAISURI BAINUN (HRPB)

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**Background:** The Surgical Site Infections (SSIs) are most frequent post-caesarean complication which accounts for increased maternal mortality and morbidity, patient dissatisfaction, prolong length of hospitalisation in addition to higher cost of the treatment. Therefore, the aim of current research was to evaluate the readmissions for post-caesarean section patient with SSIs at Hospital Raja Permaisuri Bainun (HRPB). Additionally, the study also determined incidence of post-caesarean SSIs in hospital, associated risk factors and the management of post-caesarean SSIs.

**Method:** The study was carried out in HRPB Ipoh, Perak. Matched case-control study design was utilised by using institution-based secondary data of all women who went through caesarean section and who were for re-admitted within 30 days after operation date. The sample size was calculated by using PS software for matched case-control studies was 2456 however, samples collected during study period 1<sup>st</sup> January 2019 till 31<sup>st</sup> December 2020 were 290 patients. All the cases were retrieved, and data was collected regarding the sociodemographic characteristics, clinical information of patient and surgery information. The details of patient were documented, and analysis were done using SPSS 24 software licensed to Universiti Sains Malaysia. The association between the incidence of SSIs and patient demographic, clinical factors and surgical factors was established by using simple and multiple logistic regression.

**Results:** The prevalence of post-caesarean SSIs re-admitted within 30 days was 0.83% (58/6980). Multiple logistic regression analysis revealed significant association of SSIs with employment status (95%CI: 1.39–9.49;  $P = 0.008$ ), primiparity status (95%CI: 3.52–22.93;  $P < 0.001$ ), number of previous caesarean section (95%CI: 0.08–0.85;  $P = 0.026$ ), past medical history (95%CI: 4.09–20.47;  $P < 0.001$ ), past abdominal surgical history (95%CI: 5.38–149.28;  $P < 0.001$ ), estimated duration of surgery time (95%CI: 0.07–0.69;  $P = 0.009$ ) and estimated blood loss (95%CI: 2.38–19.64;  $P < 0.001$ ) in HRPB.

**Conclusion:** The SSIs following caesarean sections represent complex clinical situations and are caused by many factors. Current study identified several risk factors associated with SSI which were broadly classified as those related with the sociodemographic characteristics of the patients, the clinical characteristics of the patients and the surgical characteristics. The sociodemographic characteristics of patients as a risk of SSIs included employment status, gestational age of less than 36 weeks and primiparous women. Similarly, the clinical characteristics of the patients associated with the incidence of SSIs included the previous history of caesarean section, past abdominal surgical history, body mass index greater than 40 and single or multiple underlying comorbid illness. Further, the surgical characteristics associated with the incidence of SSIs included estimated blood loss of more than 500 ml, and surgery time less than 60 minutes. It is therefore ascertained that the proper assessment of risk factors that predispose to SSIs is critical for the development of strategies for reducing the occurrence of SSIs.

## A 5-YEAR REVIEW OF SEVERE MATERNAL MORBIDITY (SMM) AND MATERNAL NEAR MISS (MNM) IN HUSM (2016–2020)

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**Introduction:** Maternal near miss (MNM) is characterised by a woman who came perilously close to losing her life but ultimately survived a complication arising during pregnancy, childbirth, or within 42 days of pregnancy termination, as defined by the World Health Organization in 2011. Maternal mortality continues to be a significant global issue, but it has witnessed a remarkable decline. Currently, maternal morbidities occur more frequently than maternal deaths. Therefore, the concept of maternal near miss has been proposed as a more valuable metric for assessing and enhancing maternal healthcare, complementing the insights gained from maternal death reviews.

**Objectives:** This study investigated the prevalence of severe maternal morbidity (SMM) and maternal near miss (MNM), the leading cause of it and its associated factors in HUSM for last 5 years.

**Materials and Methods:** A retrospective study involving the review of records was carried out between 2016 and 2020. Severe maternal morbidity and maternal near miss cases were categorised in accordance with the criteria established by the World Health Organization (WHO). Data collection was accomplished using the maternal near miss tool developed by the WHO working group. To identify the leading cause and related factors associated with severe maternal morbidity (SMM) and maternal near miss (MNM), descriptive analysis utilising SPSS version 26.0 was employed

**Results:** Among the 46,426 live births recorded from 2016 to 2020, 380 patients were identified as having experienced severe maternal morbidity (SMM), with 60 of them categorised as maternal near misses and 12 resulting in maternal deaths over the five-year period. The prevalence of SMM was calculated at 8.2 per 1,000 live births, while the prevalence of maternal near misses (MNM) stood at 1.3 per 1,000 live births. The maternal mortality ratio was reported as 25.8 per 100,000 live births. The primary contributors to severe maternal morbidity (SMM) were obstetric haemorrhage, affecting 147 patients (38.2%), followed by hypertensive disorders (22.4%), medical/surgical/mental diseases or complications (17.5%), and pregnancy-related infections such as sepsis (12.4%). Maternal near misses were characterised by organ dysfunction, with coagulation/haematologic dysfunction being the most prevalent at 63.3%, followed by cardiovascular dysfunction (36.6%), respiratory dysfunction (30.0%), multiple organ dysfunction (18.3%), renal dysfunction (10.0%), uterine dysfunction/hysterectomy (8.3%), and hepatic dysfunction (5.2%). The associated factors most commonly linked to SMM and MNM were previous caesarean sections, affecting 64 patients (16.9%), and anaemia, impacting 62 patients (16.4%). The majority of patients experiencing SMM and MNM underwent caesarean section as their mode of delivery, totalling 224 cases (58.9%).

**Conclusion:** This research provides a detailed examination of severe maternal morbidity and maternal near miss cases that occurred over a span of five years at HUSM. It underscores the importance of healthcare professionals continuously improving their knowledge and clinical expertise. This ongoing effort is essential for delivering the highest quality care to patients and effectively reducing the incidence of severe maternal morbidity and maternal near miss events.

*Supervisor:*  
Professor Dr. Nik Mohamed Zaki Nik Mahmood

*Co-supervisor:*  
Dr. Rahimah Abd. Rahim

### THE EFFECT OF INTRA-PARTUM GLYCEMIC CONTROL ON MATERNAL AND NEONATAL OUTCOME IN HOSPITAL SULTAN ISMAIL, JOHOR BAHRU (HSIJB)

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**Introduction:** Diabetes is a common endocrine disorder in pregnancy. The global prevalence of diabetes in pregnancy is 15.5% based on The International Diabetes Federation (IDF) estimated in 2019 (9th edition), of which 12.8% was GDM, 1.3% was pre-existing diabetes and 1.3% was diabetes first detected in pregnancy. The prevalence of diabetes in pregnancy in Malaysia is 21.5%. It's either pre-gestational or gestational diabetes. Diabetes in pregnancy is associated with maternal and fetal morbidity and mortality if not managed appropriately.

**Objectives:** Current Malaysian guidelines recommends tight intrapartum glycaemic control (4–7 mmol/L) is required to prevent the risk of neonatal hypoglycaemia post delivery thus reduced in rate of NICU admission. The objective of this study was to determine tight intrapartum glycaemic control effect on fetal hypoglycaemia and NICU admission and also maternal hypoglycaemia during intrapartum.

**Materials and Methods:** This was a retrospective observational study from 1st January 2018 until 31st December 2020 in Hospital Sultan Ismail, Johor Bahru involving 480 samples who were women with gestational or pre-gestational diabetes who delivered liveborn, singleton fetus at  $\geq 37$  weeks gestation at Hospital Sultan Ismail, Johor Bahru. Tight intrapartum glycaemic control is defined as maternal capillary blood glucose during labour process ranging 4–7 mmol. The primary outcome was neonatal hypoglycaemia, Neonatal hypoglycaemia is defined as neonatal blood glucose  $< 2.6$  mmol at first hour of live. We also looked for incidence of NICU admission for a hypoglycaemic, which defined as baby admission immediately post-delivery or within 6 hours after delivery.

**Result:** A total of 480 samples were included for this study. Gestational Diabetes on medical nutritional therapy were 179 samples, gestational diabetes on treatment were

211 and type 2 diabetes mellitus were 90 samples. It was found that there was no significant association between tight intrapartum glycaemic control and neonatal hypoglycaemia in diabetes patients. All the samples in our study had tight intrapartum glycaemic control but in our study's occurrence of fetal hypoglycaemia was 7.7 % with a p-value  $< 0.001$ . It's showed that even with tight intrapartum glycaemic control cannot prevent the neonatal hypoglycaemia. Patients with type 2 diabetes mellitus (4.6%) and gestational diabetes on insulin (3.1%) were the highest group to have hypoglycaemia babies. However, 4.2 % baby who had hypoglycaemia from type 2 diabetes mellitus and 1.5% from gestational diabetes on insulin group required IV Dextrose. Beside that, tight intrapartum glycaemic control had no significant association with maternal hypoglycaemia ( $p = 0.205$ ).

**Conclusion:** Tight intrapartum glycaemic control did not reduce the incidence of neonatal hypoglycaemia. Neonatal hypoglycaemia was associated with pre-delivery maternal glucose control regardless of tight intrapartum glycaemic control. Our results add to growing evidence that intrapartum glucose control may not be associated with a lower risk of neonatal hypoglycaemia or NICU admissions. This supports the need to identify other interventions to reduce morbidity for infants of mothers with diabetes. In future study, tight versus less tight intrapartum glycaemic control can be considered to see the better comparison and outcome. This was retrospective study, some of the data that effect the outcome might not included like maternal sepsis during labour. In addition, more relaxed intrapartum glycaemic control can be considered for all diabetes mothers in future, this also can reduce utilisation of staff.

*Supervisor:*  
Dr. Noor Adibah Hanum binti Che Hashim

*Co-supervisor:*  
Dr. Wan Fadhlina binti Wan Adnan

### EVALUATION OF MEAN MACULAR THICKNESS AND FACTORS AFFECTING MACULAR THICKNESS IN CHILDREN WITH CHRONIC KIDNEY DISEASE

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**Introduction:** Chronic kidney disease (CKD) in children is a common complication of primary and secondary renal disease causing complications like band keratopathy and cataract. Posterior segment abnormality including macular changes can be monitored non-invasively via measurement of macular thickness. Thinning of retinal neural layer is a predictive tools for early detection of visual prognosis.

**Objective:** To evaluate mean macular thickness and factors affecting mean macular thickness in children with CKD.

**Methods:** This is a comparative cross-sectional based study conducted in Hospital Universiti Sains Malaysia

from January 2021 to October 2023 involving children with CKD aged six to 17 years old. Healthy children within the same age was recruited as control group. All subjects were recruited based on inclusion and exclusion criteria underwent complete ophthalmology assessment and macular thickness measurement using Spectral Domain Optical Coherence Tomography. Data from right eye was included for analysis. Serum urea, creatinine, and albumin were taken in children with CKD. Urine dipstick albumin were documented in both groups.

**Results:** A total of 47 children with CKD and healthy children were included in the study. Children with CKD had mean age of 11.98 (3.22) years while healthy children mean age 11.64 (3.19) years. In both study groups, 28 males (59.60%) and 19 females (40.40%) were recruited. Children with early CKD had mean duration CKD of 59.04 (48.34) months and for advanced CKD 62.90 (45.63) months. The mean central macular thickness was 255.46 (24.98)  $\mu\text{m}$ , 253.52 (23.86)  $\mu\text{m}$  and 246.15 (31.55)  $\mu\text{m}$  for children with early CKD, advance CKD and healthy children respectively with no significant difference ( $p > 0.05$ ). There were significant difference in mean macular thickness for all inner and nasal outer quadrants, thicker in children with CKD compared to healthy children ( $p < 0.05$ ). There was significant difference in mean macular thickness for inferior outer quadrant, thinner in advance CKD compared to early CKD ( $p = 0.039$ ). There was no significant association between mean macular thickness in children with CKD and age, gender, blood pressure, duration CKD, on dialysis, urea, creatinine, estimated Glomerular Filtration Rate (eGFR), albumin, visual acuity, and intraocular pressure ( $p > 0.05$ ).

**Conclusion:** The study found statistically significant difference in mean macular thickness (all inner and nasal outer quadrants) thicker in children with CKD compared to healthy children. There was statistically significant difference in mean macular thickness (inferior outer quadrant) thinner in children with advance CKD. There was no significant association between mean macular thickness and age, gender, blood pressure, duration CKD, on dialysis, urea, creatinine, eGFR, albumin, visual acuity, and intraocular pressure.

*Supervisor:*  
Professor Dr. Shatriah Ismail

*Co-supervisors:*  
Dr. Evelyn Tai Li Min  
Associate Professor Dr. Mohamad Ikram Ilias

## AN EVALUATION OF THE SURVIVAL OF MALAYSIAN CHILDREN WITH UNILATERAL RETINOBLASTOMA AND ITS PROGNOSTIC FACTORS

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**Introduction:** Retinoblastoma (RB) is the most common malignant intraocular tumour in children and the most common cause of death from eye tumour worldwide.

The incidence of RB in Asia is about 1 in 16,642 live births. This study aims to determine the overall survival rate and prognostic factors in unilateral RB in Malaysian children.

**Material and Methods:** This was a retrospective cohort study of Malaysian children aged less than 17 years old diagnosed with unilateral RB from 2001 to 2020 in three tertiary hospitals in Malaysia. A total of 114 Malaysian children diagnosed with unilateral RB from 2001 to 2019 were included. All data were recorded in data collection sheet and analysed.

**Results:** The mean age at diagnosis was 29 months  $\pm$  18.9. Leukocoria was the main presenting sign (96.5%). Majority of patients were diagnosed with intraocular group E disease (57.0%). The overall survival rates of unilateral RB patients in Malaysian children were 99%, 96% and 93% at one, three and five years. All deceased patients had extraocular stage IV disease at presentation. On multivariate analysis, shorter lag time, longer duration of follow-up and compliance to follow-up were significant prognostic factors ( $p < 0.05$ ).

**Conclusion:** Unilateral RB in Malaysia has a mean age at diagnosis of 29 months. There is good one-year survival rate of 99.0% and five-year survival of 93.0%. Shorter lag time, longer duration of follow-up and compliance to follow-up are good prognostic factors for survival of unilateral RB patients in Malaysia ( $p < 0.05$ ).

*Supervisor:*  
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*Co-supervisors:*  
Dr. Jamalia Rahmat  
Associate Professor Dr. Shuaibah Ab Ghani

## MENTAL HEALTH STATUS OF PARENTS OF CHILDREN WITH MODERATE AND HIGH MYOPIA AND ITS CORRELATION WITH REFRACTIVE POWER

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**Introduction:** Myopia often occurs in children due to genetic and environmental factors. Without treatment, myopia can cause visual impairment and can contribute to mental health problems for children and their parents or caregivers. It is essential for assessing the mental health status of parents of children with moderate and high myopia.

**Purpose:** This study is aimed to compare parents' mean mental health scores and to determine the correlation between their mental health scores and refractive power of their children.

**Methods:** This cross-sectional study, conducted in Hospital Universiti Sains Malaysia from January 2022 to January 2023, involved parents of children aged six to 17, categorised into three groups based on their children's myopia levels. Myopia diagnoses were established through clinical history, refraction, and ocular examination. Mental



health status of parents was assessed using the General Health Questionnaire (GHQ)-12.

**Results:** The parents of 138 children with a mean age of  $11.4 \pm 3.4$  years and equal gender were enrolled. The majority were Malay, 134 (97.1%). More than half of siblings of high myopic children wore spectacles 25 (54.35%). The total GHQ-12 scores for the high myopia group were significantly higher than those for moderate myopia and emmetropia groups ( $p < 0.001$ ). A strong negative correlation ( $r = -0.712$ ,  $p < 0.001$ ) was observed between the total mean mental health score and the degree of myopia.

**Conclusions:** Parents in the high myopia group are likely to have a high mean mental health score compared to other groups. There was a significant correlation between a parents' mental health score and their children's refractive power. Therefore, parent's mental health issues cannot be neglected in the treatment of children with myopia.

*Supervisor:*  
Professor Dr. Shatriah binti Ismail

*Co-supervisor:*  
Professor Dr. Zahiruddin bin Othman

## EVALUATION OF ANXIETY AND DEPRESSION IN PATIENTS FOR CATARACT SURGERY AT PRE-OPERATIVE AND PERIOPERATIVE ASSESSMENT POST PANDEMIC

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**Introduction:** Cataract not only causes significant visual disability and activity of daily living limitation but also emotional stress namely anxiety and depression. A delay in intervention especially from the aftermath of the Coronavirus-19 pandemic and surgery itself may escalate these negative feelings. This emotional distress before surgery may cause unwarranted adverse effects and increase surgical risks and complications affecting surgical outcomes.

**Objective:** To evaluate anxiety and depression in patient for cataract surgery at pre-operative and perioperative assessment post pandemic using Hospital Anxiety and Depression Scale (HADS) questionnaire and identifying its association factors.

**Methods:** A prospective cohort study was conducted between April 2022 and March 2023 among cataract patients between 50 to 80 years old planned for cataract surgery. A face-to-face interview using the HADS questionnaire along with complete demographic data and full ocular examination was conducted during pre-operative assessment 2 weeks before planned surgery. All patients were then prospectively followed up until the day of planned surgery (perioperatively). Another face-to-face interview was carried out before the start of the surgery. Multiple linear regression was then used to identify the associated factors for both anxiety and depression.

**Results:** Only 340 patients from 378 were recruited where 177 were men (52.1%) and the mean age of  $65.42 \pm 7.36$  years. The prevalence of anxiety and depression in patients for cataract surgery were 6.2% and 2.9% respectively at pre-operative and 29.7% and 15.9% at perioperative assessment. Both the mean scores were higher perioperatively with  $6.31 \pm 2.47$  score for anxiety and  $4.82 \pm 2.47$  for depression. Most of the patients were of mild severity for both anxiety and depression. Multiple linear regression showed that those with at least a secondary school certificate and higher household income had lower HADS scores.

**Conclusion:** The prevalence of anxiety and depression was significantly higher perioperatively. The common association factors affecting anxiety and depression at both pre-operative and perioperative assessments were education level and household income. Thus, more effective counselling should be developed for this group of patients.

*Supervisor:*  
Professor Dr. Liza Sharmini Ahmad Tajudin

*Co-supervisors:*  
Dr. Norlelawati Abu  
Dr. Khairy Shamel Sonny Teo

## EVALUATION OF THE ACUTE EFFECT OF HAEMODIALYSIS ON RETINAL NERVE FIBRE LAYER AND MACULAR THICKNESS IN PATIENT WITH END STAGE RENAL DISEASE

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**Introduction:** Haemodialysis (HD) is a life-sustaining therapy for end stage renal disease (ESRD) patients. The toxic effects of urea and fluctuations in fluid volume, along with other electrolytes in the blood, in ESRD patients undergoing haemodialysis may also have an impact on the retinal nerve fibre layer (RNFL) and macular thickness.

**Objective:** To evaluate the acute effect of HD on RNFL thickness and macular thickness and its relationship with clinical variables.

**Methods:** A cross-sectional, multicentre study conducted in the Ophthalmology Clinics of Hospital Universiti Sains Malaysia, Lumut Malaysian Armed Forces Hospital and Tuanku Mizan Armed Forces Hospital, Malaysia, was performed between January 2021 and December 2022 among 57 ESRD patients on HD. The subjects fulfilling the inclusion criteria underwent optical coherent tomography (OCT) to evaluate the RNFL and macular thickness. Linear regression analysis was performed to evaluate the association between RNFL and macular thickness and clinical variables.

**Results:** Fifty-seven patients with a mean age of  $47.93 \pm 13.62$  years old were recruited. These patients did not have diabetes mellitus. There was a significant mean difference between pre- and post-HD in temporal RNFL thickness, superior RNFL, inferior RNFL, and average RNFL. After HD, there was a reduction in the mean thickness of the central, temporal, nasal, and average macular regions, while the

superior and inferior macular regions showed an increase in thickness. There was no significant difference in mean macular thickness ( $p > 0.05$ ) between pre- and post-HD. No significant relationship was observed between the duration of HD, total ultrafiltration, blood pressure, urea, creatinine, potassium, chloride, haemoglobin, and haematocrit level ( $p > 0.05$ ).

**Conclusion:** In conclusion, our study reveals the effect of haemodialysis on the thickness of the RNFL, while leaving the macular thickness insignificant. Surprisingly, we found no significant links between haemodialysis and the clinical variables we examined, which adds a mysterious aspect to the intricate connection between haemodialysis and retinal thickness.

*Supervisor:*

*Professor Dr. Wan Hazabbah Wan Hitam*

*Co-supervisor:*

*Brig Gen (Dr) G. Subash A/L P. Govindasamy*

## KNOWLEDGE AND AWARENESS ON GLAUCOMA AMONG COLLEGE STUDENTS IN KELANTAN: A COMMUNITY INTERVENTION STUDY

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**Introduction:** Glaucoma is the second leading cause of blindness worldwide which is caused by raised intraocular pressure and damage to the optic nerve. Good awareness and knowledge among the public will trigger them to have early eye screening and seek medical attention. Early diagnosis and prompt treatment are crucial to prevent further damage and halt the disease progression.

**Objective:** The study aims to determine the level of glaucoma awareness and knowledge, associated factors of poor awareness and knowledge among college students in Kelantan, Malaysia and to evaluate the effectiveness of education intervention on glaucoma knowledge.

**Methods:** This quasi-experimental study was conducted involving 350 participants who were divided into an intervention group and a control group. A translated and validated questionnaire which comprised questions on sociodemographic information and 14 close-ended questions on glaucoma knowledge were used to assess glaucoma awareness and knowledge. Each question was assigned one point for the correct answer and zero if incorrect or unsure. Scores of seven or more were considered good knowledge. Intervention groups were given educational intervention on glaucoma while the control group was given a presentation on cataract. Post-intervention assessments were completed at one month and three months post-intervention. Statistical analysis was used to analyse the level of glaucoma awareness and knowledge, factors influencing the level and the differences in the proportion of poor glaucoma knowledge between pre-test and post-test for intervention and control groups.

**Results:** A total of 350 participants enrolled for the study with 175 in the intervention group and 175 in the control group. The glaucoma awareness level was 12.3% and the good knowledge level was 10.9% pre-intervention. There was a significant increase in the proportion of good glaucoma knowledge in the intervention group after one month and 3 months ( $p < 0.001$ ). There was also a significant difference in the proportion of good post-test glaucoma knowledge between the intervention and control group ( $p < 0.001$ ). Family history (crude odd ratio (OR) 0.74, 95% confidence interval (CI): 0.56–0.91,  $p < 0.001$ ), eye screening programmes (crude OR –0.92, 95% CI –1.06–0.78,  $p < 0.001$  and eye examinations in the past (crude OR 0.58, 95% CI 0.46–0.7,  $p < 0.001$ ) were factors associated with awareness of glaucoma. Whereby age (crude OR 0.30, 95% CI –0.14–0.59,  $p = 0.040$ ), family history (crude OR –4.23, 95% CI –5.37–3.09,  $p < 0.001$ ), eye screening programme (crude OR 4.11, 95% CI 3.10–5.12,  $p < 0.001$ ) and eye examination in the past (crude OR –2.9, 95% CI –3.73–2.08,  $p < 0.001$ ) were the factors associated with knowledge of glaucoma prior to education intervention. Gender (OR 2.59, 95% CI 1.53–4.39,  $p < 0.001$ ) is also a statistically significant factor associated with good knowledge post-intervention using simple logistic regression. By using multiple logistic regression, education intervention ( $p < 0.001$ ) and eye examination ( $p = 0.002$ ) were strongly associated with good knowledge of glaucoma post-intervention.

**Conclusion:** Community education intervention on glaucoma showed significant improvement in knowledge among college students. Despite poor awareness and knowledge in the beginning, education intervention showed significant enhancement of knowledge. More public education campaigns should be carried out on different channels.

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## EVALUATION OF PREVALENCE OF DEPRESSION, ANXIETY, AND STRESS AND ITS ASSOCIATED FACTORS AMONG DOCTORS IN OPHTHALMOLOGY UNITS DURING COVID-19 PANDEMIC IN MALAYSIA USING DEPRESSION, ANXIETY, AND STRESS SCALE-21 QUESTIONNAIRE

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**Introduction:** Coronavirus disease 2019 (COVID-19) pandemic is a healthcare crisis, leading to psychological effects on the healthcare workers including ophthalmologists.

**Objectives:** The objectives of this study are to evaluate the prevalence of depression, anxiety, and stress and its

associated factors among doctors in the ophthalmology units during pandemic COVID-19 in Malaysia using Depression, Anxiety, and Stress Scale-21 (DASS-21) questionnaire.

**Methods:** A cross-sectional survey was conducted from June 2021 to December 2023. An online DASS-21 questionnaire, created using Google Form, was distributed via email and WhatsApp social platforms among doctors working in ophthalmology clinics at the Ministry of Health (MOH) hospitals who fulfilled the selection criteria. Data was analysed using the SPSS version 27.0.

**Results:** A total of 214 participants comprising of ophthalmologists, ophthalmology postgraduate trainees, and medical officers who fulfilled the selection criteria participated in this study. The prevalence of depression, anxiety, and stress among doctors based on analysis of DASS-21 were 22.4%, 23.4%, and 9.8%, respectively. Marital status, financial status, and perceived distress due to travel bans or isolation showed significant association with depression, anxiety, and stress. The high-risk group showed a significant association with depression and stress. Other factors, including gender, relationship or marital crisis, history of COVID-19 infection, and satisfaction with support from the hospital, were also significantly associated with the mental health of doctors in ophthalmology units.

**Conclusion:** This study has shown that the COVID-19 pandemic affected the levels of depression, anxiety, and stress experienced by doctors in ophthalmology units, and it has identified several associated factors. Hence, psychological supports in ophthalmology units should be addressed appropriately during the COVID-19 pandemic.

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## **EVALUATION OF MEIBOMIAN GLAND LOSS AND TEAR FILM LAYERS ACCORDING TO SEVERITY OF DIABETIC RETINOPATHY IN PATIENTS WITH TYPE 2 DIABETES MELLITUS USING NON-CONTACT OCULAR SURFACE ANALYSER**

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**Introduction:** Meibomian gland dysfunction (MGD) is a chronic, diffuse abnormality of the meibomian glands, causing changes in the tear film and ocular surface problems. Diabetic retinopathy (DR) and MGD are common conditions seen in diabetic patients. Increasing meibomian gland loss with tear film abnormalities can be seen as DR progresses.

**Objective:** To compare meibomian gland loss and tear film layer parameters (non-invasive tear break-up time, lipid layer thickness, tear meniscus height) according to the severity of diabetic retinopathy in patients with type 2

diabetes mellitus (T2DM) using non-contact ocular surface analyser.

**Methods:** This was a cross-sectional study involving 240 participants. Patients with T2DM attending Ophthalmology Clinic, Hospital Universiti Sains Malaysia aged 40 years old and above were recruited and further classified into three groups based on their diabetic retinopathy (DR) severity: no DR (63 eyes), non-proliferative diabetic retinopathy (NPDR) (116 eyes) and proliferative diabetic retinopathy (PDR) (61 eyes). All participants underwent a complete ocular examination followed by assessment of meibomian gland loss (MGL), non-invasive tear break-up time (NIBUT), lipid layer thickness (LLT) and tear meniscus height (TMH) using a non-contact ocular surface analyser (LacryDiag). The differences and correlation among these parameters were analysed.

**Results:** The MGL percentage, NIBUT, LLT and TMH were statistically different among the three groups ( $P < 0.05$ ). Patients with PDR exhibited higher percentage of MGL and decreased in NIBUT, LLT and TMH compared to those with no DR ( $P < 0.05$ ). MGL was negatively correlated with LLT in NPDR group ( $r = -0.23$ ,  $P < 0.05$ ) and PDR group ( $r = -0.50$ ,  $P < 0.001$ ) and was negatively correlated with NIBUT ( $r = -0.21$ ,  $P < 0.05$ ) in NPDR group.

**Conclusion:** With the progression of diabetic retinopathy, higher MGL percentage was observed, with decreased NIBUT, LLT and TMH. MGL was negatively correlated with LLT in NPDR and PDR group and was negatively correlated with NIBUT in NPDR group.

*Supervisor:*

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## **EVALUATION OF RETINAL NERVE FIBRE LAYER, MACULA THICKNESS AND VISUAL EVOKED POTENTIAL IN MIGRAINE PATIENTS**

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**Introduction:** Migraine is one of the most prevalent debilitating neurological illnesses among adults in Malaysia. The aetiology of the disease is linked to both neuronal and vascular pathways. Concerning the eye, there are reported cases demonstrating that spontaneous transient retinal vasospasm could occur during the ictal period in individuals suffering from migraines. In the present time, the literature concerning the analysis of RNFL and electrophysiological changes in patients with migraine is rather limited and not widely available. This study was conducted to evaluate the Retinal Nerve Fibre Layer (RNFL) thickness, Central Macular Thickness (CMT), and Visual Evoked Potentials (VEP) in migraine patients, as both parameters possess the potential to serve as valuable biomarkers in aiding clinicians in better managing the disease.

**Objectives:** To evaluate the RNFL thickness, CMT, and VEP in migraine patients.

**Materials and Methods:** This comparative cross-sectional study was conducted in Neurology Clinic and Ophthalmology Clinic, Hospital USM, Malaysia after obtaining ethical approval from MREC. A detailed written informed consent form was obtained from the patients who participated in the study. A Simple Random Sampling (SRS) method was applied to select participants for the migraine and control group. A total of 34 patients in the migraine group and 34 patients in control group participated in this study. During data collection, the best corrected visual acuity using Snellen Visual Acuity Chart was acquired for all patients. Anterior segment and posterior segment were examined using the slit lamp and condensing lenses. Any ocular pathology that fits the exclusion criteria was excluded from the study. All participants underwent OCT for evaluation of RNFL and macular thickness, and VEP tests on the same day. The tests were conducted by the same examiner.

**Results:** There was a statistically significant ( $p < 0.05$ ) difference in the mean between the control and the migraine group. After controlling potential confounders which are age, gender, underlying medical illness, and treatment using ANCOVA, there was a statistically significant reduction in the mean nasal RNFL thickness (adjusted mean  $110.0 \mu\text{m}$ ; 95% CI =  $105.0, 115.0$  vs.  $118.9 \mu\text{m}$ ; 95% CI =  $113.8, 123.9$ ;  $p = 0.022$ ), mean CMT (adjusted mean  $226.52 \mu\text{m}$  vs.  $244.10 \mu\text{m}$ ;  $p = 0.001$ ), delay in P100 peak latency (adjusted mean  $122.01 \text{ ms}$ ; 95% CI =  $118.9, 125.1$  vs.  $115.05 \text{ ms}$ ; 95% CI =  $111.9, 118.1$ ;  $p = 0.004$ ) and decreased amplitude of P100 (adjusted mean  $9.83 \mu\text{V}$ ; 95% CI =  $7.9, 11.7$  vs.  $13.52 \mu\text{V}$ ; 95% CI =  $11.6, 15.4$ ;  $p = 0.010$ ) in the migraine group compared to the controls. There was no significant correlation between the mean average RNFL thickness and CMT with VEP among migraine patients.

**Conclusion:** Migraine patients have thinner nasal quadrant RNFL thickness, reduced CMT, delayed P100 peak latency, and reduced amplitude of P100 compared to the controls. There is also no correlation between the mean average RNFL thickness and CMT with VEP parameters among migraine patients. OCT and VEP testing are non-invasive alternatives that have been shown to be effective in assessing ocular involvement in migraine, and these modalities should be strongly considered for regular monitoring of the disease.

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## EVALUATION OF THE EFFECT OF ORAL ISOTRETINOIN THERAPY ON MEIBOMIAN GLAND AND TEAR FILM PARAMETERS IN PATIENTS WITH ACNE VULGARIS

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**Introduction:** Oral isotretinoin therapy has been widely used to treat acne vulgaris. It has deleterious effects on the meibomian glands, thus reducing the lipid component of the tear film layer and causing evaporative dry eye. We aimed to evaluate the effects of oral isotretinoin on meibomian glands and tear film parameters.

**Objectives:** To evaluate the effect of oral isotretinoin therapy on meibomian gland and tear film parameters in patients with acne vulgaris.

**Materials and Methods:** This comparative cross-sectional observational study was approved by the Human Research and Ethical Committee (HREC), School of Medical Sciences, Universiti Sains Malaysia and National Medical Research Registry. It was carried out in accordance with the principles of the Helsinki Declaration. A detailed written informed consent form was obtained from the patients who participated in the study. Patients with acne vulgaris who were between 18 and 45 years old and who had already completed 16 weeks of systemic isotretinoin therapy were included in group A. Patients with acne vulgaris who were not treated with systemic isotretinoin were included in group B. There were 19 patients in Group A and 29 patients in Group B recruited. The right eyes of all the patients were included in the study. Patients were also excluded based on the following exclusion criteria: patients with anterior segment pathology, dry eye disease, ocular surface disease and still undergoing treatment; patients who had previous corneal, refractive or glaucoma surgery; daily contact lens wearers; and patients using oestrogen-containing medications or supplements. All patients were self-administered the OSDI questionnaire and underwent examination using a non-contact ocular surface analyser (LacryDiag, Quantel Medical, France) in this specific order starting with tear meniscus height assessment, lipid layer thickness assessment, non-invasive break-up time and meibography.

**Result:** There were statistically significant changes in the OSDI score, meibomian gland percentage loss, non-invasive break-up time and lipid layer thickness between these 2 groups. ( $p < 0.001$ ,  $p < 0.001$ ,  $p = 0.046$ , and  $p < 0.001$ , respectively).

**Conclusion:** Patients with acne vulgaris who were treated with oral isotretinoin demonstrated significant meibomian gland loss and tear film instability. Patients in this group require ophthalmology assessment.

Supervisor:

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## DEVELOPMENT AND VALIDATION OF A QUESTIONNAIRE ASSESSING DISEASE KNOWLEDGE AND SELF-CARE LEVEL (KSAR) AMONG ALLERGIC RHINITIS PATIENTS

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**Introduction:** Understanding the patient's knowledge and self-care level regarding allergic rhinitis (AR) is important as it will determine the outcome of their treatment. At present, there is still a lack of measurement tools available to assess the disease knowledge and self-care level among AR patients. Thus, the aim of this study is to develop and validate a new questionnaire for measuring knowledge and self-care among AR patients—namely Knowledge and Self-care of Allergic Rhinitis (KSAR).

**Objectives:** To develop and validate a questionnaire assessing disease knowledge and self-care level among AR patients in Hospital Sultan Abdul Halim, Sungai Petani, Kedah (HSAH), and Hospital Universiti Sains Malaysia, Kelantan (HUSM).

**Materials and Methods:** A questionnaire development and validation study were conducted. The first phase consisted of developing the questionnaire by adaptation from the literature review and consultations among expert panels. The content validation was carried out by content experts and the Content Validity Index (CVI) was calculated. The face validation was performed by AR patients and the face validity index (FVI) was calculated. The construct validity of the final KSAR questionnaire was conducted at HSAH and the HUSM among 136 patients. Exploratory factor analysis (EFA) and reliability analysis were performed to assess KSAR factorial structure and internal consistency.

**Results:** The preliminary questionnaire comprised of 16 questions (22 items) about knowledge of AR and 11 questions pertaining to the self-care of AR. During content validation, three items with low item-CVI (I-CVI) value was removed. The average CVI(S-CVI/Ave) for both knowledge and self-care domains was 0.83. Meanwhile, face validity index value was acceptable with a scale-face validity index (S-FVI/Ave) value for both knowledge and self-care domains of 0.95. The construct validation phase resulted with a finalised questionnaire consisted of seven items in knowledge domains and five items in self-care domains. The Cronbach's alpha for both knowledge and self-care domains were 0.623.

**Conclusion:** The newly developed and validated KSAR questionnaire is a valid and reliable instrument that can measure disease knowledge and self-care level among AR patients. This study provides an initial means towards developing a more refined questionnaire that aims to evaluate

patients's knowledge and self-care level, as these are among the fundamentals to improve patients' disease outcomes.

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## POST-OPERATIVE BENEFITS OF STEROID MIDDLE MEATAL PACKING IN MANAGING CHRONIC RHINOSINUSITIS FOLLOWING ENDOSCOPIC SINUS SURGERY: A SYSTEMATIC REVIEW AND META-ANALYSIS

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**Introduction:** Chronic rhinosinusitis (CRS) affected almost 14–16% of the United State (U.S.) population. CRS occurs by inflammation of sinonasal mucosa which leads to symptoms such as nasal post-nasal drip, nasal congestion and facial pressure. As a result, patient's quality of life may be affected from possible consequences likes dysosmia, body ache and social dysfunction.

CRS which is refractory to medical management, surgical treatment particularly functional endoscopic sinus surgery (FESS) has become an established and safe surgical option. Re-opening of sinus ostia helps mucociliary clearance and restored physiological drainage pathways of the sinuses resulting effective application of topical therapies and rinses to the sinonasal mucosa. However, local sinonasal inflammation may occur post-operatively which increased risk of scarring to the sinus ostia. As a result, there will be risk of adhesion, polyp recurrence and recurrence in sinus stenosis with increasing rates of revision surgery.

Topical therapies such as such as hyaluronic acid, mitomycin C, chitosan gel and steroids were used with nasal spacers which medialise the middle turbinate have been use in preventing these complications. Currently, there are investigation of devices which showed the benefits of middle turbinate medialisation and steroids. We will focus on absorbable and non-absorbable steroid nasal packing in this review. Base from previous studies whether nasal packing impregnated with steroids placed at the time of operation confers any post-operative benefit has not yet been systematically reviewed.

**Objective:** To determine the effectiveness of steroid nasal packing in preventing or reducing the development of synechiae following endoscopic sinus surgery(ESS). Endoscopic sinus surgery can fail for many different reasons, but common causes of suboptimal results include recurrent inflammation and polyposis, adhesion/synechiae formation, middle turbinate lateralisation, and stenosis of the surgically enlarged sinus ostia. Controlling for these

post-operative issues has been shown to lead to better long-term outcomes. Base from previous studies whether nasal packing impregnated with steroids placed at the time of operation confers any post-operative benefit has not yet been systematically reviewed.

**Materials and Methods:** We searched the Cochrane Central Register of Controlled Trials CENTRAL (2021, issue 2) and MEDLINE (1966 to November 2022) and Web of Science (1985 to November 2022). Randomised controlled trials comparing steroid nasal packing with placebo and standard pharmacotherapy were included. The included studies must have diagnosis of allergic rhinitis (AR) established by clinicians and the outcomes must have a minimum of four weeks of follow-up period. The primary outcomes was middle meatal adhesion. The secondary outcomes were mucosal inflammation, polyp formation, post-operative need of oral steroid, post-operative need of surgery, post-operative bleeding (significant epistaxis requiring intervention), sinus pain, and sinus-associated infection. The risk of bias and quality of evidence for all studies were appraised. The meta-analysis was done using Review Manager 5.4 software based on the random-effects model. This study is registered with PROSPERO CRD42022309859.

**Results:** Nine out of the 14 published studies resulting in a total of 819 subjects. There was trends towards reduced synechiae formation in patients who received absorbable steroid-impregnated nasal packing with collective OR 0.28 (95% CI [0.14–0.56];  $p = 0.03$ ,  $I^2 = 0\%$ , high certainty). In patients who received steroid-impregnated nasal packing compared to controls, collective OR for post-operative need for oral steroid and surgery were 0.56 (95% CI [0.38–0.84];  $p = 0.005$ ,  $I^2 = 11\%$ , high certainty) and 0.30 (95% CI [0.18–0.52];  $p < 0.001$ ,  $I^2 = 0\%$ , high certainty) respectively. Additionally, collective OR for increase in polyp formation was 0.31 (95% CI [0.38–0.84];  $p < 0.001$ ,  $I^2 = 0\%$ , high certainty). Collective mean difference (MD) for mucosal inflammation  $-10.86$  mm (95% CI  $[-15.3, -6.43]$ ,  $p < 0.001$ ,  $I^2 = 11\%$ , high certainty) respectively. There were no significant bleeding, pain or increase intraocular pressure in patients with placements of steroid-impregnated nasal packing.

**Conclusion:** The purpose of this systematic review was to summarise the available evidence of randomised trials comparing absorbable and nonabsorbable steroid-impregnated nasal packing following sinus surgery. Overall, comparisons between steroid-impregnated nasal packing showed that there was significant difference in adhesion rates compared to plain nasal packing. However, it is important to note that nasal packing materials used were different between included studies and post-operative debridement protocols were not mentioned in many of the studies. Furthermore, there is variable data regarding the use of steroid-impregnated nasal packing for the prevention of synechiae, with some studies showing a benefit. Future trials should be performed with consideration to the nasal packing material used to promote uniformity in the literature and should aim to broadly report universally accepted endoscopy scores (ie,

Lund-Kennedy) as well as absolute adhesion rates so that pooled analyses can be performed.

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## FACIAL NERVE FUNCTION ASSESSMENT IN HEAD AND NECK SURGERY USING THREE DIFFERENT TYPES OF CLASSIFICATION SYSTEMS AND ITS EFFECTIVENESS IN PREDICTING NEURAL RECOVERY

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**Introduction:** Currently, there are multiple classification systems exist for the assessment of facial nerve paralysis either objectively such as electrodiagnostic testing (nerve conduction study, electromyography, electroneurography) or subjectively, using a facial grading system (House Brackmann, Sydney, Sunnybrook). Each of these systems has its own advantages and disadvantages. It is desirable that individuals with facial palsy receive an appropriate assessment to evaluate how much they suffer from the debilitating conditions and improve their quality of life.

**Objectives:** The aim was to determine a reliable facial nerve grading system in predicting a facial palsy recovery in patients attending ORL-HNS clinic by comparing the responsiveness of three facial nerve grading systems; House Brackmann, Sydney and Sunnybrook and the nerve conduction study as the objective tools. The correlation between the subjective and objective assessment was determined.

**Materials and Methods:** A total of 22 consented participants with facial palsy were assessed with a series of photos and videography performing 10 standard facial expressions. The facial nerve severity has been graded using three different classification systems: the House Brackmann, Sydney and Sunnybrook. They were sent a for facial nerve conduction study and evaluated again at 3 months for the improvement of facial nerve paresis.

**Results:** A Wilcoxon signed-rank test showed a statistically significant change in nerve grading assessment using House Brackmann, Sydney and Sunnybrook. The responsiveness of the nerve conduction study was significant for the Nasalis and Orbicularis Oris muscles, while not significant for the Orbicularis Oculi muscle. The Nasalis and Orbicularis Oculi were also statistically significant correlation with the three-classification system except for the Orbicularis Oculi muscle.

**Conclusion:** All the three-grading systems; House Brackman, Sydney and Sunnybrook showed significant responsiveness for assessment of facial nerve palsy, especially at 3 months of evaluation. Among them, the Sunnybrook classification system showed a better value to detect facial palsy improvement. The Nasalis and Orbicularis Oris muscles were the most reliable to be used in predicting the recovery of the facial nerve based on the nerve conduction study. Thus, we advocated for the clinician to use the Sunnybrook grading for better evaluation of facial nerve palsy and its recovery. Also, to get familiarised with the nerve conduction study.

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## THYROID FUNCTION STATUS EVALUATION IN PATIENT POST-RADIOTHERAPY FOR NASOPHARYNGEAL CARCINOMA

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**Introduction:** Nasopharyngeal carcinoma is among the most common malignancy in Malaysia. Radiation-induced hypothyroidism has been reported in other countries. However, in Malaysia, no studies were ever done to determine the effect of radiation on hypothyroidism.

**Objective:** To determine hypothyroidism post radiation in patients with nasopharyngeal carcinoma.

**Materials and Methods:** A retrospective study on the symptoms and results of thyroid function test according to the dosage of intensity-modulated radiotherapy (IMRT) given to patients with nasopharyngeal carcinoma. A total of 78 patients were identified. Data were traced and analysed.

**Results:** All patients received IMRT with 33–35 fractions of radiotherapy (RT) with total dosage of 66–70 Gray given. Not all patients had their thyroid function status measured routinely. Twelve patients did develop symptoms of hypothyroidism but the blood investigations result was normal. No correlation was found between radiotherapy and hypothyroidism.

**Conclusion:** There was no correlation between intensity-modulated radiotherapy and the development of hypothyroidism.

*Supervisor:*

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*Dr. Zahirrudin Zakaria*

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## A PILOT RANDOMISED PROSPECTIVE STUDY OF EXERCISE REHABILITATION PROGRAMME AND NEUROMUSCULAR ELECTRICAL STIMULATION AS ADJUVANT TREATMENT FOR NASOPHARYNGEAL CARCINOMA PATIENTS WITH POST-RADIOTHERAPY DYSPHAGIA

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**Introduction:** Nasopharyngeal carcinoma (NPC) is a non-lymphomatous carcinoma that develops in the epithelial lining of the nasopharynx. Primary treatment for NPC regardless of staging is radiotherapy with or without concurrent chemotherapy. Dysphagia is common complication induced by radiotherapy in NPC patients. Neuromuscular electrical stimulation (NMES) had emerged as a promising complementary therapy to supplement current treatment protocols for dysphagia.

**Objectives:** This pilot study was performed to evaluate the therapeutic effect of combination therapy of NMES and exercise rehabilitation programme in the treatment of radiation-induced dysphagia in NPC patients.

**Materials and Methods:** This is a pilot prospective randomised controlled interventional study where 6 NPC patients with chronic post-radiotherapy dysphagia were assigned equally to either routine or combine therapy group. Dysphagia was defined as having Malay-version Eat Assessment Tool (M-EAT-10) score of 3 or more. Both groups were subjected to routine swallowing exercise rehabilitation programme while subjects in combined therapy group also received NMES for 8 weeks. M-EAT-10 was used to evaluate symptoms severity while Functional Oral Intake Scale (FOIS) was utilised to document functional level of oral intake. Subjects also underwent videofluoroscopic swallowing study (VFSS) where the parameters recorded were penetration-aspiration scale (PAS), oral transit time (OTT), pharyngeal transit time (PTT) and pharyngeal delay time (PDT). Data of M-EAT-10, FOIS and VFSS parameters pre and post-intervention were collected and analysed.

**Results:** Median percentage improvement in FOIS score was 20% in routine therapy group and 40% in combine therapy group, while median percentage improvement in M-EAT-10 score was 33.33% in routine therapy group and 47.37% in combine therapy group. In combine therapy group, median percentage of improvement in penetration-aspiration scale (PAS) with fluid (33.33%) and paste bolus (50%); OTT with paste (19.86%) and semi-solid bolus (17.45%); and PTT with fluid (4.42%), paste (19.71%), and semi-solid bolus (17.81%) were higher in relation to those recorded in routine therapy group. Median percentage of improvement in PAS with semi-solid (25%) was greater in routine therapy group.

**Conclusion:** Based on these descriptive data, combination therapy with exercise rehabilitation programme and NMES have more positive effects than routine swallow therapy in the treatment of post-radiotherapy dysphagia in NPC patients. These 2 techniques should be implemented

in all post radiation NPC patients who has dysphagia during follow-up clinic. Further research is needed to both explore the effectiveness of this combined.

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## COMPARING THE ACCURACY OF DISTORTION PRODUCT (DP) AND TRANSIENT-EVOKED (TE) OTOACOUSTIC EMISSION (OAE) IN HEALTHY NEONATES WITH OR WITHOUT VERNIX OCCLUSION IN HOSPITAL USM

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**Introduction:** Newborns who underwent hearing screening and failed have a high chance of getting early intervention for their hearing problems. Early intervention and intensive rehabilitation will increase their quality of life, thus decreasing hearing problems' negative effects. Providing hearing screening evaluation is very important to every neonate with or without risk factors (1). Various tools have been used for a newborn hearing screening. Otoacoustic Emissions (OAE) is a technology recommended for newborn hearing screening and is considered efficient and highly reliable with high sensitivity and specificity (2). OAEs provide a non-invasive objective indicator of healthy cochlear function and can be done without sedation given to newborns. It has been shown that the use of OAE during the first few days after birth has proven to be a simple, fast, accurate, and cost-effective neonatal hearing screening (3). Two OAEs are used in newborn hearing screening; Transient-Evoked OAEs (TE OAEs) and Distortion Product OAEs (DP OAEs). According to some works of literature, TE OAE seemed to be better than DP OAE in neonatal hearing. Thus, we compare these two tools' accuracy in healthy neonates with or without vernix and look at which tools are most affected by the vernix in neonatal hearing screening.

**Objectives:** The otoacoustic emission (OAE) tool is used widely in neonatal hearing screening. There are two tools, Distortion Product Otoacoustic Emission (DP OAE) and Transient-Evoked Otoacoustic Emission (TE OAE), used for the screening depending on the certain health centre. The objective is to compare the accuracy of DP OAE and TE OAE in healthy neonates with or without vernix occlusion in Hospital Universiti Sains Malaysia. Our study aims to compare which OAE is more reliable to use in daily neonatal hearing screening.

**Methods:** This cross-sectional study was conducted in Hospital Universiti Sains Malaysia (Hospital USM), Kubang Kerian, Kelantan. Before the data collection, informed

consent from the parents of each participant will be collected. The participants of this study will be selected randomly among healthy neonates in Hospital USM that meet the inclusion and exclusion criteria stated. Each participant will undergo hearing assessments that include otoscopy and otoacoustic emission (DP OAE and TE OAE). These tests were done once each ear but repeated for a second time if the results failed at the first time recorded. Each participant takes approximately half an hour to complete, provided the neonate is in the optimum relaxed condition. The inclusion criteria are neonates without any known risk factors for hearing loss and all healthy neonates born in Hospital USM aged less than 48 hours, irrespective of with or without the presence of vernix. They will then be put in two groups: the "with vernix occlusion" group and the "without vernix occlusion" group. The exclusion criteria are neonates admitted to Neonatal ICU or neonates with pinna and ear canal deformity.

**Results:** A total of 90 patients was recruited in this analysis, and all categorical data were presented in frequency and percentage. Comparison between two groups, such as the DP OAE and TE OAE groups, were made using the chi-square test. To measure agreement between two diagnostic tools, we applied Cohen's K test. The  $p$ -value of less than 0.05 was considered statistically significant. The statistical analysis was performed using version 26 of the SPSS software (SPSS Inc, Chicago, IL). There was a significant association between DP OAE and Vernix (5.08 (1),  $p = 0.024$ ), and there was a significant association between TE OAE and Vernix (8.23 (1),  $p = 0.004$ ) (Table 2). In between vernix and DP OAE, there was a significant association. The presence of vernix has 2.09 odds of DP OAE failure compared to no presence of vernix (Crude OR 2.09, 95% CI:1.10, 3.99),  $p = 0.025$ ). Meanwhile, there was also a significant association between vernix and TE OAE. The presence of vernix has 2.94 odds of TE OAE failure compared to no presence of vernix (Crude OR 2.94, 95% CI:1.38, 6.24),  $p = 0.005$ ) (Table 3). There was a significant association of sensitivity and specificity between DP OAE and TE OAE (63.37 (1),  $p < 0.001$ ). The sensitivity between the DP OAE and TE OAE test was 83.6%, and its specificity was 82.5%, acceptable (Table 4). Meanwhile, the Cohen's  $\kappa$  test was run to determine if there was an agreement between two OAE tests on healthy neonates with or without vernix was good or poor. There was a moderate agreement between the two OAE judgements and statistically significant ( $\kappa = 0.578$ ,  $p < 0.001$ ) (Table 5).

**Conclusions:** TE OAE is a good tool for neonatal hearing screening. In our study, the hearing screening results of babies with vernix and no vernix received more pass results in DP OAE than TE OAE. Thus, it suggests that vernix has less influence on the DP OAE test and reduces the failed results thus, DP OAE is more suitable for hearing screening in neonates.

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## NECESSITY OF PERFORMING ROUTINE FREE THYROXINE LEVEL IN EVERY THYROID FUNCTION TEST WITH NORMAL THYROID - STIMULATING HORMONE

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**Introduction:** Thyroid-stimulating hormone (TSH) and free thyroxine (fT4) have a complex, non-linear relationship, in which slight changes in fT4 can lead to relatively significant changes in TSH. Hence, TSH measurement is considered as the most beneficial initial test of thyroid function for most patients. However, fT4 and TSH are frequently ordered together excessively, and at significant costs.

**Objectives:** The objective of this study is to assess the proportion of thyroid function tests (TFT) which have normal TSH with normal fT4 values, and the proportion of TFT which have normal TSH with abnormal fT4 values. It is postulated that all TFT with normal TSH would have normal fT4 values, and TSH alone would suffice for screening for thyroid disorders.

**Materials and Methods:** This cross-sectional study was conducted at Hospital Universiti Sains Malaysia, involving data analysis of TSH and fT4 for three years from January 2017 until December 2019 which were extracted from Laboratory Information System (LIS). Our study population included adult patients, aged 18 years old and above, who had normal TSH values with normal and abnormal fT4 values. We excluded pregnant patients and those below 18 years old as they had different reference interval. The data was then imported from Microsoft Excel into SPSS for data analysis.

**Results:** There were 36,161 TSH taken within three years. After we excluded all samples taken from pregnant ladies and children below 18 years old, the total TSH left was 18,467. Out of that number, there were 16,599 samples which had TSH values within the reference interval used in the laboratory, which was between 0.27–4.20 mIU/L. Considering the measurement uncertainty of TSH within the study period at lower and upper limits were 0.02 and 0.24 mIU/L respectively, this study redefined the normal range of TSH to be between 0.25–4.44 mIU/L. Hence, the total TSH samples within the redefined normal range of TSH increased to 16,660. Out of 16,660 samples with normal TSH, there were 70 samples taken without fT4, leaving the total to be 16,590. The reference interval of fT4 used in the laboratory was between 12.00–22.00 pmol/L, with measurement uncertainty at lower and upper limits were 0.80 and 2.04 pmol/L respectively. Hence the new redefined reference interval of fT4 was between 11.20–24.04 pmol/L. After we considered the measurement uncertainty and redefined the reference interval of fT4, the proportion of samples with normal TSH and normal fT4 was 15,125. Hence, the proportion of TFT with normal TSH and normal fT4 was 15,125 out of 16,590, which was 91.2%. Whereas the proportion of TFT with normal TSH and abnormal fT4 was 1465 out of 16,590, which was 8.8%.

**Conclusion:** Most of the TFT with normal TSH had normal fT4 values, which was 91.2%. Hence, our findings did not support the routine measurement of fT4 in every TFT with normal TSH, and TSH alone is suffice for screening for thyroid disorders.

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## TRANSLATION AND VALIDATION STUDY OF OBSTRUCTIVE SLEEP APNOEA (OSA-18) QUESTIONNAIRE INTO BAHASA MALAYSIA

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**Introduction:** According to the American Academy of Sleep Medicine, Obstructive Sleep Apnoea (OSA) is a sleep-related breathing disorder that involves a decrease or complete halt in airflow despite an ongoing effort to breathe. The Obstructive Sleep Apnoea (OSA-18) questionnaire is a short and self-administered questionnaire to assess the symptoms and quality of life of paediatric patients with OSA.

**Objectives:** To translate OSA-18 questionnaire into Bahasa Malaysia version to be used in general paediatric population in Malaysia for OSA QoL assessment and screening tools.

**Materials and Methods:** This cross-sectional study is conducted at the otorhinolaryngology (ORL) clinic of Hospital Universiti Sains Malaysia. The forward and backward translation of the OSA-18 questionnaire into the Malay language was performed and tested for content and face validity. The questionnaire's internal validity and reliability were tested using the Pearson's Correlation, Cronbach Alpha and Inter-reliability Coefficient Tests. The psychometric properties (validity, reliability, and reproducibility) were assessed.

**Results:** We observed 84 patients ranging from 6 months up to 12 years of age. The mean age was 8 years old, and 63.1% were male patients. Among the samples, 96.4% presented with palatine tonsillar hypertrophy, and 84.5% presented with adenoid tonsillar hypertrophy. Based on the questionnaire answered by the patient's caregiver, the Pearson's correlation demonstrated that all the symptom scales correlate and measure the same things. The Cronbach's  $\alpha$  coefficient value for each symptom scale was acceptable, within 0.6–0.8. The total Cronbach's  $\alpha$  coefficient value is 0.89. The test-retest evaluation was excellent, with the value of intra-class correlation (ICC) more than 0.90.

**Conclusion:** The Malay version of the OSA-18 questionnaire is equivalent to the original English version. It is an effective tool to assess the paediatric OSA patient's

symptoms and quality of life-based on the obtained validity, reliability, and reproducibility values. Therefore, it is recommended to be used as a screening tool in daily practice.

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## THE EFFECTS OF COLOURING MANDALA ON ALPHA BRAIN ACTIVITY AND THE LEVEL OF ANXIETY SCORES AMONG UNIVERSITY STUDENTS

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**Introduction:** University students are often reported to have low levels of mindfulness when experiencing stressful events. Mandala colouring is beginning to attract attention as a form of art therapy to reduce anxiety. We hypothesised that colouring mandala is one of the methods for improving the anxiety symptoms reflected in brain activity.

**Objective:** This study aims to investigate alpha brain activity and anxiety levels before and after colouring mandala among university students.

**Methodology:** An experiment study was conducted among sixty students with moderate and high levels of anxiety at Universiti Sains Malaysia. The recruited participants were randomly assigned into either i) the intervention group, ii) the control group. Both groups spent approximately 20 minutes per session colouring a mandala with a madala pattern or colouring a blank circle on A4 paper. Beck Anxiety Inventory (BAI) in the Malay version to assess the anxiety level of the students before and after the colouring session. Additionally, electroencephalography (EEG) g.Nautilus was used to measure the students' alpha brain activity before and after the colouring session.

**Results:** There is a significant increase in alpha power before and after colouring activity both in intervention and control group. An intervention group showed a significant change in alpha power at frontal area ( $z = -3.383, p = 0.001$ ). A control group demonstrated a significant increase in alpha power at frontal and central region with Cz ( $z = -1.985, p = 0.047$ ) and Fz ( $z = -2.417, p = 0.016$ ). Also, the anxiety scores are significantly lower in both colouring conditions ( $z = -4.310, p < 0.001$ ;  $z = -4.402, p < 0.001$ ).

**Conclusion:** Colouring activity provide university students a practical and engaging tool for improving their mental well-being and quality of life. Both colouring activities serve as effective, safe, and one of the alternatives in managing anxiety symptoms among university students. This finding found that the process of colouring contributes

to relaxation and increase their focus attention as shown by changes in alpha activity.

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## EXPLORING BRAIN ACTIVATION AND MEMORY PERFORMANCE OF SINGLE-DIGIT AND DOUBLE-DIGIT IN FAMILIAR AND UNFAMILIAR NUMERALS IN MALAYSIAN CHINESE YOUNG ADULTS: A FUNCTIONAL MRI STUDY

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**Introduction:** The ability to symbolise numbers using numerals is unique to humans and needs to be acquired via learning. The Number Form Area (NFA), located in the ventral occipitotemporal gyrus, has been suggested to be involved in visual number symbols processing. The acquisition of the semantic information of the numerical symbols is suggested be a prerequisite for the NFA activation; however, much of its semantic information remains unknown.

**Objective:** The present study aims to explore the brain activation associated with familiar and unfamiliar single-digit and double-digit numerals.

**Methodology:** Twelve Malaysian Chinese young adults with a mean age of 22.83 years ( $SD = 1.47$ ) were recruited. Participants were presented with both familiar (Chinese) and unfamiliar (Arabic) single-digit and double-digit numerals. They were then asked to complete a forced-choice memory task during functional magnetic resonance imaging measurements. This study employed within-subjects experimental study design, incorporating two factors: type of familiarity (familiar vs. unfamiliar) and the number of digits (single-digit vs. double-digit). These factors were used to measure the reaction time and brain activations in all experimental conditions.

**Results:** A significantly shorter mean reaction time was observed with familiar numerals compared to unfamiliar numerals ( $p < 0.001$ ), as well as with single-digit compared to double-digit numerals that were familiar ( $p = 0.008$ ). Right fusiform gyrus showed significant activation during the encoding of unfamiliar numerals. Several regions, including the bilateral fusiform gyrus, bilateral superior parietal gyrus, left angular gyrus, right pars opercularis, and left associative visual cortex exhibited significant activation during the retrieving phase of unfamiliar numerals.

**Conclusion:** The results indicate significantly better memory performances for familiar numerals compared to unfamiliar ones. Differential neuronal activations patterns were observed in the encoding and retrieval phases of

unfamiliar numerals compared to familiar numerals. Familiarity emerged as an important factor affecting memory performance, with greater activation in the working memory-related regions when processing unfamiliar numerals.

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## ATTENTION AMONG CHILDREN WITH LETTER REVERSAL WRITING: AN ERP OF N100, P300 AND N170 COMPONENTS

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**Introduction:** Letter reversals sometimes are referred to as mirror writing which means writing alphabets or numbers backwards or upside down. Experts believe children would diminish that letter reversals by 7 and 1/2 years old. However, some children might not outgrow reversing letters in primary school's standards 2 and 3.

**Objective:** Our study aims to examine their aspects of attentional abilities (alerting, orienting and inhibition) compared to normal letter writing children using Children's Version of Attention Network Test (ANT-C)

**Methodology:** Neuroimaging, which is event-related potentials (ERP), is used in this study. Thirty-two children participated in the study were evaluated with the ANT-C to assess the attentional constructs (alerting, orienting and inhibition). ANT-C is adapted to be more child-friendly by replacing the flanker in the adult version ANT with five fish. The mean ages and standard deviations for the 16-letter reversal writing (RW) children and 16 normal letter writing (NW) children were  $9.02 \pm 0.60$  and  $8.99 \pm 0.58$ .

**Results:** Our study demonstrates distinct outcomes in the alerting, orienting, and inhibitory networks when comparing letter reversals children and normal letter writing children. A notable interaction effect was seen between the invalid cue and group ( $p = 0.004$ ). Children who write letters reversal displayed a smaller mean amplitude of N170 in relation to invalid stimuli. A significant main effect also identified in the P300 component ( $p = 0.012$ ). Letter reversal writing children showed a greater P300 amplitude in response to incongruent stimuli at Cz, O1 and O2. Researchers suggest that children who exhibit letter reversal in their writing may possess different mechanisms for allocating orienting attentional and inhibition resources compared to normal letter children.

**Conclusion:** Regarding this aspect, the present study's findings suggest that letter reversal writing children portray an atypical orienting and inhibition attentional processing of visual information. The current research contributes significantly to our understanding of the behavioural RT

performances and neural bases of attentional networks in normal and letter-reversal children.

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## THE EFFECTS OF OUTDOOR ACTIVITIES ON P300 COGNITIVE COMPONENT AMONG ADULT ONLINE LEARNERS

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**Introduction:** Since the Covid-19 pandemic, online learning courses have become the new norm in higher education and soft skills training. Recent results of a systematic review show that outdoor activities such as walking, hiking or outdoor sports have significant cognitive effects in terms of selective attention, sustained attention and working memory.

**Objective:** In this study, we aimed to achieve two objectives: 1. To compare the difference in the P300 component between groups with and without outdoor activities; 2. To compare the difference in reaction time and behavioural performance (i.e. correct and incorrect response on congruent and incongruent trials) between the groups.

**Methodology:** This was a cross-sectional study consisting of two independent groups. This study was conducted at Reskills Online Learning hub based in Klang Valley from 1<sup>st</sup> to 30<sup>th</sup> March, 2023 from 11am till 4pm. The study included two groups: (1) outdoor activity participants,  $N = 13$  and (2) non-outdoor activity participants,  $N = 11$ . Participants were selected based on their lifestyle, which includes routine outdoor activities such as nature exercises pertaining to outdoor walking, hiking, jogging and outdoor sports, and participants those who do not engage in outdoor activities. Both groups are also routinely involved in online learning, a term defining instructional learning that is electronically delivered through a variety of multimedia and Internet platforms and applications. Other words like "web-based learning," "e- learning," "computer-assisted education," and "Internet-based learning". The selected participants performed a visual Stroop colour word task while wearing the EEG cap on their head to learn more about their P300 cognitive component, reaction time, and comparison of behavioural patterns between these groups.

**Results:** The participants aged from 26–40 years with highest percentage of 17% respondents from 27 years old. Total 13 male participants of 54.2% compared to 11 females took part in this study. The SPSS independent T-test for P300 of the outdoor activity group showed significant  $P < 0.05$ , with mean = 58.11; SD = 22.76  $\mu V$ . The reaction time rendered a mean = 1.74; SD = 1.86 millisecond compared to the non-outdoor activity group. We found a significant difference in the P300 component between outdoor and non-

outdoor groups,  $t(10.29) = -11.18, p < 0.05$ . The magnitude of Mean Differences =  $-595$ , with 95% CI:  $-713.62$  to  $-477.20$ , less than '0' rendered significant too. However, there is no significant difference in the reaction time,  $t(22) = -0.40, p = 0.99 (> 0.05)$  and behavioural performance between group,  $t(22) = -0.99, p = 0.07 (> 0.05)$ .

**Conclusion:** This study explores the relationship between outdoor activities and the P300 component, aiming to measure attention span among online and soft skills learners. The results obtained by analysing the raw data from the EEG device indicate that outdoor activities can improve the attention span of online academic and soft skill learners, thus improving the overall learning experience of users.

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## THE EFFECTS OF DRAWING ON MOOD REGULATIONS AMONG PAEDIATRIC HEALTHCARE WORKERS

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**Introduction:** The paediatric healthcare workers experience higher risk of emotional burnout due to the emotional attachment involved in their work. The exposure to traumatic experiences has a cumulative effect on healthcare workers, leading to higher levels of symptomatic distress. This can lead to decreased efficiency and quality of work, affecting every aspect of life. Hence, emotion regulation, a goal-directed mechanism, is crucial in regulating negative emotions such as stress. Two attention deployment strategies for emotion regulation are distraction and expression. Research has shown that drawing to distract and drawing to express can improve mood, suggesting an alternative to adaptive coping strategies for healthcare workers dealing with work stressors.

**Objectives:** The study aimed to examine the effects of drawing to express versus drawing to distract in mood regulation among paediatric healthcare providers.

**Materials and Methods:** The study used an experimental design, with randomised subjects, pretest-posttest control group design. A total of 61 paediatric healthcare workers from Hospital Universiti Sains Malaysia signed up to participate, however only 55 ( $N = 55$ ) was eligible and recruited, after screening using Perceived Stress Scale (PSS). Upon signed consent, all participants were guided through a 3-minute imagery task meant to induce negative emotion. Then pre-assessment was done to measure

the participants' current mood using the Positive and Negative Affect Scale (PANAS). Then, they were randomly assigned into one of three condition groups: drawing to express, drawing to distract and symbol task scanning, served as an active control condition. After one session of doing the activities designated to each condition, PANAS was readministered for the second time. After four consecutive days of doing the activities, they answered the PANAS again for the third time.

**Results:** The study found that there are significant effects of both drawing groups (drawing to express and drawing to distract) and non-drawing group on increasing positive affect ( $p < 0.001$ ), as well as on decreasing negative affect ( $p < 0.001$ ) among paediatric healthcare workers. However, there is no significant difference in the effectiveness of increasing positive affect among the three condition groups ( $p = 0.83$ ), but there is a significant difference in the effectiveness of decreasing negative affect among the three condition groups ( $p = 0.02$ ). In addition, in both drawing groups, drawing after four sessions improves positive affect (as indicated by a positive contrast score) and reduces negative affect (as indicated by a negative contrast score) more than just one drawing session.

**Conclusion:** The study explored the use of drawing as an emotion regulation strategy among paediatric healthcare workers. The findings suggest that drawing can enhance emotional well-being and may contribute to occupational health practices. The benefits of drawing are more evident when employed for a period of time, suggesting that various healthcare professionals who experience emotionally demanding tasks may benefit from using this self-help tool.

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## LEARNING VOCABULARY WITH OR WITHOUT CONTEXT: AN N400 ERP STUDY

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**Introduction:** Vocabulary is an essential aspect of language proficiency. While contextualised learning has been traditionally favoured, recent findings suggest decontextualised approaches may be equally effective for vocabulary acquisition.

**Objective:** This study aimed to compare the effectiveness of contextualised and decontextualised vocabulary learning approach using both behavioural measures and the N400 ERP component as a neural marker of novel word learning.

**Methodology:** This study employed a between-subjects experimental design. Forty healthy young adults were recruited and randomly assigned to two learning group: Context group ( $n = 20$ ) or Definition group ( $n = 20$ ). The key



difference between the groups was the method of vocabulary learning. Participants in the context group inferred the meaning of 80 classical Malay words from sentence contexts, whereas participants in the Definition group were given direct definitions. Both groups then completed a semantic word pair priming paradigm where the participants were required to assess the relatedness of the second word (target) to the first word (prime). The participants' correct response rate and their N400 ERP response were recorded during this paradigm.

**Results:** No significant difference was found between the two groups in terms of correct response rate ( $p = 0.367$ ).  $2 \times 2$  repeated measures ANOVA of the N400 ERP amplitude revealed a significant main effect of target relatedness ( $p = 0.003$ ). However, no significant interaction was found between target relatedness and group ( $p = 0.107$ ). Both groups were found to exhibit significantly lower N400 ERP amplitude for Related compared to Unrelated targets.

**Conclusion:** Neurophysiological findings suggest both contextualised and decontextualised learning modifies N400 responses in a manner consistent with successful vocabulary acquisition. The lack of significant difference between groups indicates that both contextualised and decontextualised methods are equally effective for short term learning. Future research should investigate whether the findings of the current study are applicable to long-term vocabulary learning.

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## EFFECTS OF ORAL ADMINISTRATION OF BIO-KESUM (POLYGONUM MINUS) ON COGNITIVE FUNCTION IN ALZHEIMER'S DISEASE ANIMAL MODEL

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**Introduction:** *Polygonum minus* (*P. minus*) is an herbal plant with various uses in food, perfumery, and the medical industry. *P. minus* extract contains flavonoids with antioxidant and anticholinesterase capacities, which can enhance cognitive function. Previous studies have demonstrated that *P. minus* extract can improve memory. However, its role in a chronic cerebral hypoperfusion (CCH) animal model, resembling human vascular dementia, has not been explored.

**Objective:** This study investigates the effects of administering aqueous *P. minus* extract on various stages of learning and memory processes and the metabolic pathways involved in chronic cerebral hypoperfused rats induced by permanent bilateral occlusion of common carotid arteries (PBOCCA) surgery.

**Methodology:** Learning and memory performance of Sprague Dawley male rats underwent PBOCCA surgery and 14 days oral treatment of *P. minus* extract to sham and treatment groups. They were then assessed using Open field test (OFT), Novel recognition test (NOR), Morris water maze (MWM). Elisa test was conducted for Acetylcholine (ACh) and Gamma aminobutyric acid (GABA) levels in the hippocampus.

**Results:** OFT test using one-way ANOVA and Bonferroni *post hoc* test results shows no significant changes in the total activity in treatment groups as compared to vehicle treated groups ( $p > 0.05$ ). Oral treatment with *P. minus* extract at doses of 200 and 300 mg/kg enhanced recognition memory in PBOCCA rats ( $p < 0.05$ ) analysed using Student's *t*-test. MWM acquisition learning results shows PBOCCA rats treated with 100 mg and 200 mg/kg *P. minus* showed a spatial learning pattern when compared to PBOCCA rats treated with vehicle using two-way repeated measures ANOVA. In probe trials analysed using one-way ANOVA the treated groups significantly affected the amount of time in the target quadrant ( $p < 0.0001$ ). It also showed that the PBOCCA groups considerably decreased the proportion of time spent in the target quadrant ( $p < 0.0001$ ). In Elisa test a high dose (300 mg/kg) of *P. minus* extract significantly increased the expression of neurotransmitters ACh and GABA in the hippocampus analysed using student's *t*-test.

**Conclusion:** The current findings demonstrate the memory-restorative effects of *P. minus* extract in the CCH rat model, suggesting that *P. minus* extract could be a potential treatment for vascular dementia and Alzheimer's disease and has merits for further evaluation.

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## THE RELATIONSHIP BETWEEN OBSESSIVE-COMPULSIVE SYMPTOMS, INTOLERANCE OF UNCERTAINTY AND CYBERCHONDRIA AMONG YOUTHS IN MALAYSIA

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**Introduction:** Cyberchondria is a phenomenon where one repeatedly conducts online searches of health information in a compulsive manner in response to anxiety derived by uncertainties.

**Objectives:** The aim of this study is to investigate the relationship between obsessive-compulsive symptoms, intolerance of uncertainty and cyberchondria among youths in Malaysia.

**Materials and Methods:** An online cross-sectional survey was employed where data was collected from 150 participants recruited through convenient sampling to fill in the Cyberchondria Severity Scale, Dimensional Obsessive-Compulsive Scale and Intolerance of Uncertainty Scale.

**Results:** Results found significant relationships between obsessive-compulsive symptoms, intolerance of uncertainty and cyberchondria ( $p < 0.001$ ). Weak to moderate significant positive associations were found between the subscales of DOCS and CSS-12 ( $r = 0.45$ ,  $p < 0.001$ ) and IUS-12 and CSS-12 ( $r = 0.40$ ,  $p < 0.001$ ). Lastly, a significant difference in the scores of cyberchondria was observed between individuals at risk of OCD and those who are not, where those at risk obtained a higher mean score of cyberchondria ( $p < 0.001$ ).

**Conclusion:** Therefore, difficulties in tolerating uncertainties and compulsive behaviour predicted the tendency to repeatedly search for health information online which showed that cyberchondria is a phenomenon worth exploring among Malaysians.

Supervisor:

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## INVESTIGATING THE LEVEL OF DEPRESSION AND ANXIETY AMONG MALAYSIAN OLDER ADULTS RESIDING IN LONG-TERM CARE FACILITIES

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**Introduction:** The rapid growth of Malaysia's elderly population poses significant physical and psychological challenges, as well as opportunities for long-term care (LTC) facilities in addressing physical, social, emotional and psychological needs.

**Objective:** This study aimed to study the differences in levels of depression and anxiety among Malaysian older adults in nursing homes, assisted living, and mixed system facilities.

**Materials and Methods:** A cross-sectional study design was conducted, involving 50 elderly residents aged 65 and above from LTC facilities in Kuala Lumpur and Selangor. Participants were screened based on age, duration of stay in LTC facilities, capacity to provide consent, physical and psychological disorders, and cognitive ability using the Montreal Cognitive Assessment. Then, the Beck Depression Inventory-II and the Beck Anxiety Inventory were administered.

**Results:** A multinomial logistic regression showed that participants from mixed system facilities were not significantly more likely to experience lower levels of depression,  $b = 19.84$ , Wald's  $\chi^2(1) = 0.00$ ,  $p = 0.997$ , and anxiety,  $b = 0.26$ , Wald's  $\chi^2(1) = 0.08$ ,  $p = 0.775$ , compared to those in nursing homes or assisted living facilities. However, a one-way multivariate analysis of variance showed significant differences in the levels of depression and anxiety

among residents across different types of LTC facilities, Wilks's  $\Lambda = 0.67$ ,  $F(4, 92) = 5.05$ ,  $p = 0.001$ .

**Conclusion:** The findings highlight the need for tailored interventions and integrated approaches to address the psychological needs of LTC residents. Despite limitations such as sample size and study design, future research may focus on longitudinal and qualitative methodologies to enhance understanding and improve mental health outcomes in LTC settings.

Supervisor:

Dr. Mohd Faizal Mohd Zulkifly

Co-supervisor:

Dr. Mohd Nasir Che Mohd Yusoff

## THE LIVED EXPERIENCES OF RESILIENCE AMONG WOMEN LIVING WITH HIV IN MALAYSIA: A QUALITATIVE STUDY

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**Introduction:** Living with HIV carries significant stigma, especially for women, who face numerous challenges beyond the medical implications of the condition. The stigma and discrimination surrounding HIV contribute to a sense of shame and can exacerbate physical health concerns, increasing their risk of developing mental health issues. Understanding how women living with HIV (WLHIV) in Malaysia conceptualise and experience resilience is crucial for developing effective support systems.

**Objectives:** The present study aimed to explore the lived experiences of resilience among WLHIV in Malaysia, identifying key factors that contribute to their resilience at individual, interpersonal, and community levels.

**Materials and Methods:** A qualitative research design with a phenomenological approach was used to understand how WLHIV make sense of their experiences. Ten WLHIV were recruited through purposive and snowball sampling. Semi-structured, face-to-face interviews were conducted at either Community Healthcare Clinic (CHCC) or Kuala Lumpur AIDS Support Services Society (KLASS). Interviews were conducted in English or Malay based on participant preference, and complemented with field notes. Interviews were transcribed verbatim and analysed using thematic analysis.

**Results:** Three major themes emerged from the data: 1) conceptualisation of resilience, 2) barriers to resilience, and 3) facilitators of resilience. Participants' conceptualisation of resilience varied but commonly included themes of acceptance, optimism, and strength. They navigate complex emotional landscapes, with resilience shaped by a combination of individual, interpersonal, and community-level factors. Barriers to resilience included psychological issues like depression and fear, interpersonal challenges like family problems and discrimination from healthcare workers, and societal stigma. Despite these barriers, women demonstrated resilience through various strategies such as acceptance,

seeking social support, helping others, and maintaining a healthy lifestyle.

**Conclusion:** The findings reveal that resilience among WLHIV in Malaysia is multifaceted, encompassing individual traits, interpersonal relationships, and community support. These insights can raise awareness about the challenges of living with HIV and assist mental health and medical professionals in tailoring interventions to meet both the physical and mental health needs of WLHIV. Addressing these factors is crucial for enhancing the resilience and overall well-being of this population.

*Supervisor:*

*Dr. Mohd Nasir bin Che Mohd Yusoff*

*Co-supervisor:*

*Associate Professor Dr. Azizah Othman*

### **VALIDATION OF THE MALAY TRANSLATED PRESCHOOL ANXIETY SCALE AMONG PARENTS OF PRESCHOOL-AGED CHILDREN IN KOTA BHARU, KELANTAN**

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**Introduction:** Anxiety disorders among children have been on the rise, affecting 6 to 31.9% of the global population. Early identification and intervention are crucial as anxiety symptoms in preschoolers can significantly impact their social, emotional, and cognitive development. The lack of validated measures for assessing anxiety among preschoolers in Malaysia hinders early detection and intervention efforts.

**Objectives:** This study aims to translate and validate the Preschool Anxiety Scale (PAS) into Malay (PAS-Malay) to assess anxiety symptoms among preschool-aged children in Malay-speaking populations. Additionally, it seeks to determine the reliability and convergent validity of PAS-Malay by comparing it with the established Strength and Difficulties Questionnaire – Malay Version (SDQ-Mal).

**Materials and Methods:** A cross-sectional study design was used, involving 161 parents/caregivers of preschool-aged children from Kota Bharu, Kelantan. The PAS was translated into Malay language following a rigorous process involving bilingual postgraduate students and was validated by six specialists in related fields. Data were collected using online questionnaires distributed through preschools and social media. Statistical analyses, including reliability analysis using Cronbach's alpha, and confirmatory factor analysis (CFA), were conducted to validate the PAS-Malay. Correlation analysis was used to assess convergent validity with SDQ-Mal.

**Results:** Reliability analysis indicated good internal consistency for PAS-Malay (Cronbach's alpha > 0.70). CFA showed acceptable factor loadings after removing poorly performing items, improving model fit indices (CFI = 0.710, TLI = 0.683, RMSEA = 0.100, SRMR = 0.085). Significant correlations between PAS-Malay and SDQ-Mal subscales confirmed convergent validity, indicating that PAS-Malay

effectively identifies anxiety symptoms alongside other emotional and behavioural difficulties.

**Conclusion:** The PAS-Malay is a reliable and valid tool for assessing anxiety in Malay-speaking preschoolers, addressing a critical need for culturally appropriate measures. It supports early detection and intervention in both clinical and research settings, with future studies needed to enhance its robustness through larger samples and clinical testing.

*Supervisor:*

*Associate Professor Dr. Azizah Othman*

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### **EXISTENTIAL ANXIETY IN THE AGE OF SOCIAL MEDIA: THE MEDIATING ROLE OF SELF-COMPASSION**

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**Introduction:** The rapid development of social media platforms has raised the alarm bells about its negative impact on young adults' mental health condition over time. Despite the benefits of connectivity and sharing, social media usage is increasingly linked to serious psychological issues like existential anxiety. However, those who embrace self-kindness and understand that everyone has struggles might find a smoother path through their adulthood and found to develop low existential anxiety. Social media exposure (SME) is defined as the degree to which users engage with the digital platforms (e.g. Facebook, Instagram, YouTube, TikTok); Existential anxiety (EA) refer as a state of distress and unease when individual contemplating about own life's meaning and the purpose; and self-compassion (SC) is defined as being kind and understanding towards ourselves.

**Objectives:** The general objective of the current study is to determine the relationship between SME and existential anxiety among young adults in Malaysia. Specifically, to determine the mediating role of SC in the relationship.

**Materials and Methods:** The present study employed the quantitative research method with cross-sectional research design. Purposive and Snowballing sampling method were being utilise in the study. The materials involved participants informed consent form, demographic data form, Social Media Use Integration Scale (SMUIS), Existential Concern Questionnaire (ECQ), and the Self-compassion scale (SCS). Statistical analysis of multiple linear regression by using PROCESS plug in SPSS version 25 was being conducted.

**Results:** The mediation analysis supported the first hypothesis that SC significantly mediate the relationship between SME and the existential anxiety among young adults in Malaysia (indirect effect  $B = -.052$ ,  $SE = 0.16$ , 95% CI  $[-0.86, -0.22]$ ). Moreover, the result also showed that a lower levels of SME and higher levels of SC were significantly associated with lower existential anxiety among young adult in Malaysia.

**Conclusion:** The current finding suggesting that SC partially mediate the relationship between SME and existential anxiety, indicating that there are potential factors that beyond SC, such as the nature of the content consumed on social media and the context of interaction might play a role in the relationship between SME and existential anxiety.

*Supervisor:*  
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## THE DIFFERENCES IN SELECTIVE VISUAL ATTENTION IN ONE TO ONE ONLINE COMMUNICATION OF YOUNG ADULTS WITH DIFFERENT LEVELS OF SOCIAL ANXIETY

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**Introduction:** Selective visual attention refers to the ability to focus on specific stimuli while ignoring others. Different patterns of visual attention often exhibit among individuals with social anxiety, which can affect their perception of social interactions and their responses to them.

**Objectives:** This study examined the differences in visual attention between low social anxiety and high social anxiety young adults in Malaysia using eye tracking apparatus.

**Materials and Methods:** Forty-nine participants were recruited via purposive sampling based on the inclusion and exclusion criteria required. Eye movements of the participants were tracked when the participants were engaged in a pre-recorded conversation video. Social anxiety levels among the participants were measured using Liebowitz Social Anxiety Scale (LSAS). Eye tracking apparatus was used to measure the parameters of visual attention in fixation count, total fixation duration, time to first fixation, first fixation duration, total duration of visit and visit count, between the low and high social anxiety groups. Independent sample t-test was used to analyse the differences of parameters in predefined area of interest (AOI), which included eye, nose, forehead and mouth regions of the face.

**Results:** The results from the study showed there was a significant difference in visual attention on the eye region between low and high social anxiety group during virtual social interaction. High social anxiety group exhibited significantly more fixation count, longer fixation duration and longer total visit duration on the eye region when compared with low social anxiety group. The results indicated that individuals with higher social anxiety exhibited more visual attention to the eye region which enable them to detect potential threats in social interactions.

**Conclusion:** These findings validated the alternative hypothesis that there is a significant difference in selective

visual attention between low and high social anxiety groups during online communication.

*Supervisor:*  
Dr. Mohamed Faiz Mohamed Mustafar

## ASSESSING THE IMPACT OF A SCHOOL-BASED POSITIVE PSYCHOLOGY INTERVENTION ON ADOLESCENT WELL-BEING THROUGH GRATITUDE

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**Introduction:** The study is a positive psychology intervention that uses gratitude to enhance well-being. The aim is to assess the impact of conducting a psychological intervention at a school setting on the personal well-being of students. As adolescents spend a significant amount of time at school, the research explores the idea of using school-based interventions to cultivate positive mental health among youth. Positive psychology interventions are used as they are less intrusive focusing on building positive emotions rather than focusing on negative experiences.

**Objectives:** The study has the following research objective;

To examine the differences in scores of personal well-being among stateless children attending NGO schooling before and after four gratitude-drawing intervention sessions.

To examine the differences in mood scores among stateless children attending NGO schooling before and after four gratitude-drawing intervention sessions.

**Materials and Methods:** The study was conducted at a non-governmental educational centre for stateless adolescents. Participants were aged between 12 and 15, selected based on universal sampling. The study was conducted over four one hour sessions over two weeks. The instruments used were the Personal Wellbeing Index-SC (PWI-SC) and pre and post-intervention comparison on well-being while the Ottawa Mood was used to monitor participants mood on a weekly basis.

**Results:** The results from 30 participants were analysed using a paired sample t-test on two dimensions of the scale- Happiness with Life as a Whole and Personal Wellbeing Index. The results were not significant,  $t(30) = -1.039$ ,  $p = 0.154$  for Happiness with Life as a Whole and  $t(30) = -0.922$ ,  $p = 0.182$  for the Personal Wellbeing Index. The average mood scores from 24 participants on the Ottawa Mood Scale showed slight increase at 5.9, 6.5, 6.54 and 7.2. A paired sampled t-test comparing the average scores from session 1 and 4 found a significant increase at  $t(23) = -2.574$ ,  $p = 0.017$ .

**Conclusion:** While there was no significant increase in well-being, there was a significant increase in mood. The



discussion section explains why and offers future directions of studies in the area of positive psychology.

*Supervisor:*  
Dr. Sabarisah Hisham  
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### **MEDIATING EFFECT OF SOCIAL SUPPORT ON THE RELATIONSHIP BETWEEN COGNITIVE EMOTIONAL REGULATION STRATEGIES AND DEPRESSION AMONG UNDERGRADUATE STUDENTS IN MALAYSIA**

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**Introduction:** Cognitive emotional regulation strategies play a critical role in determining life satisfaction and are essential for managing anxiety and depression. Deficiencies in effectively employing these strategies, coupled with inadequate social support, are often central to the development and persistence of depression.

**Objectives:** The purpose of the study is to investigate the mediating effect of social support on the relationship between cognitive emotional regulation strategies and depression among undergraduate students in Malaysia.

**Materials and Methods:** Participants were required to complete an online survey consisting of the Beck Depression Inventory-II (BDI-II), the Multidimensional Scale of Perceived Social Support (MSPSS), and the Cognitive Emotion Regulation Questionnaire (CERQ). Data obtained were analysed using correlational and mediation analysis.

**Results:** Correlational analysis revealed that maladaptive strategies are significantly positively correlated with depression. Conversely, adaptive strategies, which are acceptance ( $r = 0.229$ ), putting into perspective ( $r = 0.237$ ) and positive reappraisal ( $r = -0.124$ ), are significantly positive and negative correlates with depression. Mediation analysis revealed social support as a partial mediator of the relationship between the CER acceptance strategy ( $B = 0.988$ ,  $p = 0.000 < 0.05$ ) and the CER putting into perspective ( $B = 1.080$ ,  $p < 0.05$ ) with depression. There is also a significant negative correlation between social support and depression ( $r = 0.259$ ), which suggests that lower levels of depression are linked to higher levels of perceived social support from family, significant other and friends.

**Conclusion:** This study highlights the significance of adaptive CER strategies and social support in alleviating depression among undergraduates. Interventions aimed at enhancing these factors show potential for effectiveness. However, longitudinal studies are necessary to establish causal relationships. Future research incorporating

qualitative methods and cultural considerations could refine interventions, leading to improved mental health outcomes.

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*Co-supervisor:*  
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### **SPATIAL ANALYSIS OF BREAST CANCER IN HUSM: CLINICOPATHOLOGICAL FACTORS ASSOCIATED WITH LATE STAGE BREAST CANCER PATIENT**

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**Introduction:** According to Malaysia National Cancer Registry Report (MNCRR) 2012–2016, The Age Standardise Rate (ASR) was increase from to 34.1 per 100000 populations with staging was reported were detected at late stage (stage III & IV) which was 4.7% higher compared to the previous reports. Geographic Information Systems (GIS) is a software that can generate spatial information data, statisticians and data analysts routinely encounter scientific data sets with geocoded locations. With the application of GIS software, we will evaluate spatial distribution of breast cancer patient and determine clinicopathological factors associated with late stages breast cancer patient in HUSM

**Methods:** This is a retrospective study. This study included female patients who had histopathology examination confirmed to have breast cancer. The data collected from year 2018 to 2020 were included in the study. A total of 224 completed data was obtained for the subject of the study. Logistic regression analysis was performed to identify significant factors associated with stage 4 breast cancer. In the logistic regression analysis, simple logistic regression was initially performed to obtain the crude odds ratio (COR) of the predictors, and then multiple logistic regression to obtain their adjusted odds ratio (AOR). All statistical analyses were conducted using statistical product and service solution (SPSS) version 26. QGIS analysis provided visual data and zonal distribution of the factors associated stage 4 disease.

**Results:** for 1-year increase in age, the odds of progressing from stage 3 to stage 4 cancer will decrease by 1% ( $AOR = 0.99$ ,  $P = 0.711$ ). For breast side: the right side has 33% higher chance of progressing from stage 3 to stage 4 cancer compared to the left side ( $AOR = 1.33$ ,  $P = 0.530$ ). For Oestrogen Receptors: those with oestrogen receptor positive were about seven times more likely to progress from stage 3 to stage 4 cancer compared to those with negative ( $AOR = 7.62$ ,  $P = 0.067$ ). For progesterone receptor: those with progesterone receptor positive were 90% less likely to progress from stage 3 to stage 4 cancer compared to those with negative ( $AOR = 0.10$ ,  $P = 0.039$ ). For histological examination: Those with invasive carcinoma were three times more likely to progress from stage 3 to stage 4 cancer

compared to those with other carcinoma (AOR = 3.00,  $P = 0.44$ ); and those with invasive ductal carcinoma were four times more likely to progress from stage 3 to stage 4 cancer compared to those with other carcinoma (AOR = 4.20,  $P = 0.422$ ). For HPE: those with invasive carcinoma were 39% less likely to progress from stage 3 to stage 4 cancer compared to those with other carcinoma (AOR = 0.61,  $P = 0.696$ ) and those with invasive ductal carcinoma were 79% more likely to progress from stage 3 to stage 4 cancer compared to those with other carcinoma (AOR = 1.79,  $P = 0.689$ ). Spatial analysis shows average near neighbour summary given the z-score of -13.18, there is a less than 1% likelihood that this clustered pattern could be the result of random chance.

**Conclusions:** Spatial analysis using Geographical Information System can provide integrated value for the statistical analysis. The spatial characteristic was clustered for the late stage breast cancer patients in this study.

*Supervisor:*

Dr. Wan Zainira Wan Zain

Dr. Tengku Ahmad Damitri Al-Astani Tengku Din

Dr. Maya Mazuwin Yahya

## USE OF NHS PREDICT TOOL IN PATIENTS WITH BREAST CANCER IN HOSPITAL SULTANAH NUR ZAHIRAH

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**Introduction:** PREDICT is an online free prognostication tool to estimate survival in breast cancer patients according to the types of treatment given. Our study is to validate the accuracy of PREDICT tool and the factors affecting survival in patients with breast cancer.

**Methods:** A retrospective cohort study based on data collected from Hospital Sultanah Nur Zahirah in stage I to stage IV breast cancer from 2011 to 2017. The observed 5-year survival rate was compared with the predicted 5-year survival rate using PREDICT, and calibration and discriminatory accuracy were assessed using Chi-squared goodness-of-fit test and receiver-operating characteristic (ROC) analysis. Cox's proportional hazard regression model was used to identify factors associated with overall survival.

**Results:** The predicted and observed 5-year overall survival in 355 selected patients were 75.8% and 75.2%, with a difference of 0.6%. The model performed fairly well with area under curve (AUC) of 0.747 (95% CI: 0.69–0.81) in predicted 5-year overall survival. Among the 585 patients diagnosed with stage I to stage IV breast cancer, stage at presentation (HR Stage III = 5.8, 95% CI: 1.69, 19.94), (HR Stage IV = 10.6, 95% CI: 3.09, 36.49) surgical treatment (HR without surgical treatment = 2.29, 95% CI: 1.73, 3), radiotherapy (HR without radiotherapy = 1.92, 95% CI: 1.41, 2.62) and neoadjuvant chemotherapy (HR without neoadjuvant chemotherapy = 0.63, 95% CI: 0.47, 0.86) were found to be statistically significant and associated with death in breast cancer patients.

**Conclusions:** PREDICT tool accurately estimate the 5-year overall survival in our centre. It might serve as

a useful prognostication tool during consultation and aid in counselling our patients. Late stage of disease, patients without surgical treatment and without radiotherapy are associated with a higher risk of death in breast cancer.

*Supervisor:*

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*Co-supervisors:*

Associate Professor Maya Mazuwin Yahya

Dr. Hussain Mohamad

## APOPTOTIC EFFECT OF ETLINGERA ELATIOR (BUNGA KANTAN) EXTRACT ON HUMAN COLORECTAL CANCER CELL LINE (HCT 116)

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**Introduction:** Cancer is one of the leading cause of death worldwide. Colorectal cancer is the 3<sup>rd</sup> the most commonest cancer in Malaysia. There is a growing interest in complementary medicine in battling cancer patient for the past decades based on the social and cultural context. Based on previous study *Etlingera elatior* (*E. elatior*) or torch ginger had benefit as an anticancer, anti-inflammatory, antimicrobial, and antioxidant.

**Objective:** This study was conducted to evaluate anticancer properties of *Etlingera elatior* flower on colorectal cancer cell lines, HCT 116.

**Methodology:** The torch ginger plant or *E. elatior* was home grown in Kota Bharu, Kelantan. After cleans and dried the *E. elatior*, the flower was blended to become powder. Then the powder was successfully extracted with aqueous, n-hexane, ethyl acetate and methanol by using Soxhlet apparatus. The extracts will be tested to the cancer and normal cell with a positive control (chemotherapy drug) and negative control (DMSO solvent) in-vitro. All were analysed using thiazolyl blue tetrazolium bromide (MTT) assay. The viability of the cell was determined by IC<sub>50</sub> value. The IC<sub>50</sub> value is a concentration that inhibit 50% of the cell proliferation. The best extracts fraction (lowest IC<sub>50</sub>) is then used in subsequent study. Apoptotic effect of *E. elatior* extract towards the cancer cell were observed by using annexin V-FITC, BD Pharmingen, BD 556420 kit. Meanwhile, cell cycle analysis was tested using Cycletest Plus DNA Reagent Kit. End results were analysed by using flow cytometry analysis.

**Result:** From the MTT assay result, there were significant cytotoxic effect of n-hexane extract of *Etlingera elatior* to colorectal cancer cell with IC<sub>50</sub> value obtained was 35.67 µg/mL. The morphological changes also can be seen clearly after 72 hours of treatment where the cell was shrink with formation of apoptotic body. Flow cytometry analysis showed cell cycle arrested at G<sub>1</sub>Go cell phase and achieved early and late apoptosis respectively.

**Conclusion:** N-hexane extract of *Etlingera elatior* had an apoptotic effect towards the colorectal cancer cell. Hence, it has potential to be developed as a form of chemotherapeutic agents with less side effect and cost-effective in the future.

**Supervisor:**  
Associate Professor Dr. Rosnelifaizur bin Ramely

## EVALUATION OF OUTPATIENT VERY LOW-CALORIE DIET AS A PART OF ERAS PROTOCOL IN BARIATRIC SURGERY HRPB IPOH

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**Introduction:** Pre-operative preparation is important in patients undergoing bariatric surgery ensuring good post-operative outcomes. An energy-restricted diet is often prescribed before bariatric surgery to reduce weight and liver volume.

**Methodology:** A cross-sectional study with a retrospective review of medical records from January 2015 until December 2019. The study population was patients who underwent elective laparoscopic Roux-En-Y Gastric Bypass and Laparoscopic Sleeve Gastrectomy in Hospital Raja Permaisuri Bainun, Ipoh. Inclusion criteria were based on performed bariatric surgeries from January 2015 until December 2019, patients who had outpatient VLCD, and patients with BMI of 35 kg/m<sup>2</sup> to 59 kg/m<sup>2</sup>. Data such as pre-VLCD BMI, post-VLCD weight loss, intraoperative bleeding and/or postponement, and post-operative weight loss were reviewed and analysed.

**Results:** A total of 72 out of 139 patients met the inclusion criteria. The median pre-VLCD BMI was 47.40 kg/m<sup>2</sup> (40.83, 53.17). There were 67 patients (93.1%) who experienced weight loss post-VLCD and the median weight loss post-VLCD was 2.7 kg (2.0, 4.0). The median VLCD duration was 10 days. None of the patients had intra-op postponement related to technical difficulties due to hepatomegaly, however, there were 2 (2.8%) patients observed to have small bowel perforation which was unrelated to the objective of this study. Pre-operative ultrasound abdomen findings showed that 63 patients had fatty liver/hepatomegaly (87.5%), 15 (20.8%) had cholelithiasis, 3 (4.2%) had hepatosplenomegaly, and 2 (2.8%) had gall bladder polyps. The median post-op weight loss was 19.1 kg, and the median duration of hospital stays was 5 days.

**Conclusion:** Although patients with outpatient VLCD did not achieve the recommended 10% weight loss before surgery we were still able to proceed and complete the surgery without intra-operative postponement as there was no major intraoperative bleeding mainly from the liver as a possible factor to deter us to continue the surgery safely. The significant weight loss three months post-operatively was

likely due to the surgery itself rather than the short period of VLCD post-operatively.

**Supervisor:**  
Mr. Wan Muhamad Mokhzani Wan Muhamad Mokter

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## CEA DENSITY IS A NEW TOOL FOR PREDICTIVE FACTOR FOR COLORECTAL CANCER

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**Introduction:** We evaluate the CEA (Carcinoembryonic antigen) density as the novelty tool for predictive factors in non-metastatic colorectal cancers.

**Methods:** A prospective database was retrospectively analysed for all non-metastatic colorectal cancer patients between January 2010 and June 2019. They were categorised into two groups according to the median CEA density: low (< 4.24), high (≥ 4.24), and further stratified by their disease stage. The inclusion criteria were all the patients who had curative resection for colon or rectal adenocarcinoma. Sociodemographic data and pre-operative CEA, mortality, morbidity, overall survival (OS) and disease-free survival (DFS) were estimated over five years.

**Results:** A total of 230 patients were included. The median patient age was 66 (range 28–91) and 50.4% male (n = 116). There were 154 colonic cancers and 76 rectal cancers. The median follow-up time was 60 months (range 24–60). Twenty-five (10.9%) had a local recurrence, and 70 patients (30.4%) had evidence of metastatic disease after the initial curative resection. CEA density was significantly associated with a smaller maximum tumour diameter measured from histopathological specimen (43.81 mm vs. 73.25 mm, *p* < 0.01), higher pre-operative serum CEA levels (39.42 ng/ml vs. 7.18 ng/ml, *p* = 0.006) and inadequate lymph nodes harvested (< 12 lymph nodes, *p* < 0.001). The odds of OS and DFS in patients with stage III disease with low CEA density were lower than in those having stage II disease with high CEA density.

**Conclusions:** CEA density was associated with a smaller maximum tumour diameter measured, higher pre-operative serum CEA level, and inadequate lymph nodes harvested. Stage II disease with high CEA density has better OS and DFS than stage III disease with low CEA density. Future studies with a larger sample and cut point analysis can be helpful to estimate CEA density that can accurately predict survival.

**Supervisor:**  
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