13TH PUBLIC HEALTH & OCCUPATIONAL MEDICINE CONFERENCE

Free Papers (Oral) Listing

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Background: Antimicrobial resistance in community-acquired uropathogens is increasing. Our study evaluates the risk factors associated with resistance to commonly prescribed antibiotics for urinary tract infections (UTIs) in the Singapore primary care setting.

Methods: A prospective cohort study in three public primary care polyclinics in Singapore was conducted from 2015 to 2016. Participants were patients presenting with UTI symptoms and diagnosed with culture-confirmed UTI. Among patients with uropathogens from the Enterobacteriaceae family, univariate analysis was performed to determine patient characteristics associated with resistance to amoxicillin-clavulanate, ciprofloxacin and co-trimoxazole. Multiple logistic regression models were subsequently constructed to determine factors independently associated with antibiotic resistance.

Results: Of 299 participants, 277 (92.6%) had UTIs due to Enterobacteriaceae isolates. Of these, 37 (13.4%) were resistant to amoxicillin-clavulanate, 67 (24.2%) to ciprofloxacin, and 72 (26.0%) to co-trimoxazole. On univariate analysis, amoxicillin-clavulanate resistance was positively associated with Indian ethnicity (compared to Chinese ethnicity), recent UTI in the last twelve months, recent hospitalisation in the last six months, and history of diabetes mellitus (DM). For ciprofloxacin and co-trimoxazole, factors associated with resistance were: recent UTI, antibiotic use, or hospitalisation (both); genitourinary (GU) abnormalities (both); and age group (ciprofloxacin only). On multivariate analysis, Indian ethnicity (adjusted OR, AOR=3.79; 95%CI 1.36-10.55; p=0.01) and DM (AOR=2.25; 95%CI 1.02-5.00; p=0.05) were associated with amoxicillin-clavulanate resistance, while recent UTI or hospitalisation, and GU abnormalities were associated with ciprofloxacin and co-trimoxazole resistance.

Conclusion: Clinicians should routinely assess for identified clinical risk factors associated with antibiotic resistance, and obtain urine cultures to guide treatment where indicated.
Oral Presentations

O12. SIX MONTH RESULTS OF A RANDOMIZED CONTROLLED TRIAL OF AN INCENTIVE-BASED PHYSICAL ACTIVITY PROGRAM TARGETING BOTH CHILDREN AND ADULTS (FIT-FAM)

Finkelstein E.A. *,†, Lim R.S.M. †, Tan J.Y.J. †, Agrawal S. †
*Presenting author; †Corresponding author; † Program in Health Services and Systems Research, Duke-NUS Medical School, Singapore; † Lien Centre for Palliative Care, Duke-NUS Medical School, Singapore

Background: We aim to test whether a strategy that rewards children for meeting physical activity (PA) goals, but only if their parents reach an identical goal, can effectively increase parents’ PA.

Methods: This is a 12-month, two-arm randomized controlled trial involving 316 parent-child dyads. Parents are full-time employees with participating children aged 7-11. In the Child-Based Incentive (CBI) arm, children earn SGD$5 for each week that they log ≥10,000 daily steps for ≥4, ≥5, and ≥6 days in months 1-3, 4-6, and 7-12, respectively, on Fitbit pedometers. In the Family-Based Incentive (FBI) arm, rewards for FBI children are identical but contingent on their paired parent achieving the targets also. Multilevel mixed-effects linear regression with controls for age, sex, and ethnicity will be used to assess various accelerometer-measured outcomes at months 6 and 12: number of steps (primary), duration of moderate-to-vigorous PA (MVPA), and MVPA bout minutes.

Results: On average, 58% of FBI parent-child dyads achieved the weekly step targets throughout the first 6 months compared to only 23% of CBI parent-child dyads. Accelerometers, worn for 7 days, reveal that FBI parents walked 4,364 more steps (~3 km more) and clocked 32 more MVPA minutes and 30 more MVPA bout minutes than CBI parents at month 6.

Conclusion: Results reveal that the family-based reward scheme is an effective strategy for increasing PA for both children and parents over a 6-month time period. This novel incentive strategy can be adopted as part of a broader, comprehensive strategy for improving overall health.
O13. PREDICTORS OF ALL-CAUSE MORTALITY OF PATIENTS WITH CHRONIC KIDNEY DISEASE (CKD) IN SINGAPORE

G Y Ang¹, C W Yap¹, I T Liew², W T Weng², P Shen², R Lim², X Y Ooi², A Liew²

¹ Health Services & Outcomes Research, National Healthcare Group (NHG), Singapore; ² Department of Renal Medicine, Tan Tock Seng Hospital (TTSH), Singapore

Background: The prognosis of chronic kidney disease has been found to be poor and mortality rate increases with severity of CKD and albuminuria severity. This study aims to identify the predictors of all-cause mortality using routine data.

Methods: Patients with Stage 3-5 CKD (estimated glomerular filtration rate [eGFR] less than 60 mL/min per 1.73 m²) referred from primary care physicians to TTSH Renal Department between 1 January 2009 to 31 December 2012 were included in this study. The patients were followed up till death or 31 December 2017. Cox proportional hazards regression modelling was used to assess the factors associated with all-cause mortality through backward elimination.

Results: Over a median follow up period of 5.9 years, 1,216 out of 2,675 patients (45.5%) died. The annual mortality rate was 83.6 per 1000 individuals (95% confidence interval [CI] 79.1 -88.5) and the mortality rate increased with severity of CKD and urine albuminuria severity. Predictors of all-cause mortality were hypertension, age, estimated glomerular filtration rate, body mass index, serum albumin, serum phosphate, parathyroid hormone and urine albuminuria severity. Receiver Operating Curve-Area Under Curve to predict death at 1 and 5 years are 0.802 (95% confidence interval [CI] 0.744-0.860) and 0.773 (CI 0.748-0.798).

Conclusion: Our study estimated the annual all-cause mortality rate for patients with chronic kidney disease kidney disease and identified predictors of all-cause mortality. This study has affirmed the poor prognosis of these patients and an urgency to intervene early so as to retard the progression to later stages of CKD.
Oral Presentations

O14. PROTEIN INTAKES DURING COMPLEMENTARY FEEDING IS ASSOCIATED WITH CHILDHOOD BMI: THE GROWING UP IN SINGAPORE TOWARDS HEALTHY OUTCOMES (GUSTO) COHORT STUDY

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Background: Macronutrient composition of weaning diets has been associated with childhood obesity. We examined associations between dietary macronutrient intake in infants (6 to 12 months of age) and BMI z-scores and overweight status at later ages in early childhood.

Methods: Single-day dietary records of 941 infants from the GUSTO study were analysed at 6, 9 and 12 months of age. Outcomes assessed were child BMI and overweight status measured at 15-48 months of age, with analyses based on nutrient density substitution models.

Results: Mean (SD) carbohydrate, protein and total fat intakes (as % of energy) were 48.1 (5.2), 9.8 (2.4) and 42.1 (6.3), respectively (at 6 months) and 50.8 (7.7), 14.5 (3.3), 34.7 (7.6), respectively (at 12 months). In fully-adjusted models, a higher protein, lower total fat intake at 6 months was associated with higher BMI z-score at 15-48 months (0.069 SD per 1% increase in protein; 95% CI: 0.021, 0.117). A faster increase in protein intake, at the expense of total fat, over 6 to 12 months of age was associated with a substantial increase in BMI z-score from 15 to 48 months (0.363 SD per 1% increase of protein/month; 95% CI: 0.113, 0.613). No significant associations were observed between macronutrient intakes and risk of overweight.

Conclusion: Higher protein intake and faster rate of increase in that intake from 6 to 12 months were associated with an increased BMI z-score from 15 to 48 months of age. These findings require further confirmation in independent studies.
Background: Studies are divided on the short-term association of air pollution with stroke. Singapore is exposed to seasonal transboundary haze. We aimed to investigate the association between air pollution and stroke incidence in Singapore.

Methods: We performed a time-stratified case-crossover analysis on all ischemic stroke cases reported to the Singapore Stroke Registry from 2010-2015. Exposure on days was compared with control days on which exposure did not occur. Control days were chosen on the same day of the week earlier and later in the same month in the same year. We fitted a conditional Poisson regression model to daily stroke incidence that included Pollutant Standards Index (PSI) and environmental confounders. PSI was categorized based on established classification (0-50=Good, 51-100=Moderate, 101≥Unhealthy). We assessed the relationship between stroke incidence and PSI in the entire cohort and in predetermined subgroups of individual-level characteristics.

Results: There were 29384 ischemic stroke cases. Moderate and unhealthy PSI showed association with stroke occurrence with incidence risk ratio (IRR) 1.10, 95% confidence interval (95%CI) 1.06-1.14 and IRR1.13, 95%CI 1.03-1.25 respectively. Subgroup analyses showed generally significant association, except in Indians and non-hypertensives. The association was significant in subgroups age≥65, female, Chinese, non-smokers and those with history of diabetes, hypertension and hyperlipidemia. Stratified by age and smoking, the risk diminished in smokers of all ages. Risk remained elevated for five days after exposure.

Conclusion: We found a short-term elevated risk of ischemic stroke after exposure to air pollution. These findings have public health implications for stroke prevention and emergency health services delivery.
**O16. REFERRAL PATTERNS IN A TERTIARY CARE HOSPITAL IN SINGAPORE**

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**Background:** Hospitalised patient care often requires multiple providers’ input, usually via cross-referrals (between units in the same institution). Given increasing prevalence of multimorbidity and provider subspecialisation, referrals are likely to increase. This may result in care fragmentation and delays in instituting care. However, no prior study has described the macro-level patterns of referrals at the tertiary level. This study evaluates the utilization patterns in a large (1,700 bed) academic teaching hospital.

**Methods:** We retrospectively evaluated all adult patient referrals in the Singapore General Hospital from Jan 2016 to Mar 2018, using anonymized data including: sending/receiving departments, urgency level, patient demographics, and Charlson Comorbidity score. Patterns were visually evaluated using network heat-mapping.

**Results:** We analysed 101,316 referrals. Compared to standard referrals, urgent referrals were for younger (1.41 years, 0.94 - 1.88) and male patients (OR 1.13, p <0.00). Comorbidity was not significantly different statistically. Overall high recipient departments included General Surgery, Renal Medicine (Urgent), and Cardiology (Standard). High sending departments included Cardiothoracic surgery (Urgent rates 1.12 per 100 patient-days) and Rheumatology, Endocrinology, Dermatology and Cardiology (Standard rates >10 per 100 patient-days).

Pattern analysis showed clustering between Medical Oncology to Palliative Medicine, and Cardiology to Cardiothoracic Surgery. Internal Medicine showed strong network relation to Renal Medicine/General Surgery for urgent referrals, with a more diffuse standard referral recipient pool.

**Conclusion:** We demonstrated the utility of an EMR-based system to study referral patterns. This could lead to work to improve and benchmark referrals, and formulate strategies which could be department-specific, based on qualitative studies of patterns, and manpower/resource availability.
O17. SOCIODEMOGRAPHIC AND CLINICAL FACTORS ASSOCIATED WITH ACCEPTANCE OF OUTPATIENT PARENTERAL ANTIBIOTIC THERAPY IN A SINGAPORE TERTIARY HOSPITAL FROM 2014-2017

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Background: We were interested in assessing factors associated with acceptance of outpatient parenteral antibiotic therapy (OPAT) amongst patients in a large Asian tertiary hospital cohort.

Methods: From 2014 to Oct 2017, we reviewed the case records of all patients referred to Singapore General Hospital’s (SGH) Outpatient Parenteral Antibiotic Therapy (OPAT) service. We compared differences in sociodemographic and clinical factors between patients who opted for OPAT and those who declined, using chi-square test for univariate analysis and logistic regression for multivariate analysis.

Results: From 2014 to Oct 2017, a total of 1406 referrals were made to SGH’s OPAT service. Of these, 95.9% (1349/1406) were deemed suitable for OPAT. The top reasons for unsuitability were availability of alternative oral options and medical unsuitability for OPAT. Amongst those who were deemed suitable for OPAT, 90.0% (1213/1349) eventually preferred OPAT treatment. On multivariate analysis, being independently ambulant (aOR=3.46, 95%CI=2.21-5.37) was independently associated with higher likelihood of acceptance for OPAT; whereas patients with peripheral vascular disease were less likely to opt for OPAT (aOR=0.32, 95%CI=0.16-0.62). Socioeconomic status (SES) was closely associated with OPAT acceptance, with markers of both individual-level SES (subsidised ward class) and area-level SES (staying in a public rental flat) being independently associated with lower odds of OPAT preference. The top three reasons for rejecting OPAT treatment were as follows: lack of caregiver (n=35); mobility issues (n=24); financial issues (n=24); and difficulty caring for the line (n=21).

Conclusion: Comorbidities, mobility and financial issues are all important factors to consider when determining suitability for OPAT. More can be done to improve accessibility of OPAT amongst lower-income patients and those staying in lower-SES areas.
021. EPIDEMIOLOGY OF PNEUMOCOCCAL DISEASE AND ASSOCIATED FACTORS FOR INVASIVE PNEUMOCOCCAL DISEASE IN AN ACUTE TERTIARY HOSPITAL IN SINGAPORE: 2015-2017

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Background: *Streptococcus pneumoniae* infection is associated with significant mortality and morbidity worldwide. This study describes the epidemiology of pneumococcal disease among patients admitted to Tan Tock Seng Hospital. Within this group, we identify risk factors associated with invasive pneumococcal disease (IPD).

Methods: Participants in this retrospective study were adult inpatients with either positive streptococcal urinary antigen tests or positive blood cultures for *S. pneumoniae*, admitted from January 2015 to December 2017. Descriptive statistics were analysed for the overall cohort, and a case-control study was conducted to compare patients with IPD against those with non-invasive pneumococcal disease.

Results: We identified 491 patients with pneumococcal disease. The cohort was predominantly elderly (mean age 69.1 ± 15.5 years), male (N=321, 65.4%), and Chinese (N=355, 72.3%), and 80 (16.3%) had received pneumococcal vaccination (PCV13 and/or PPSV 23) at any time prior to admission. The median Charlson’s comorbidity score was 2 (IQR 0.5-3.5). Eighty-seven (17.7%) patients had IPD. Compared against non-invasive disease, IPD patients were younger (mean age 61.4 years versus 70.8 years, P<0.001), had a lower proportion with pneumococcal vaccination before admission (3.5% versus 19.1%, P<0.001) and had higher inpatient mortality (26.4% versus 11.4%, P=<0.001). On multivariate analysis, younger age (adjusted OR, AOR=0.96, 95%CI 0.95-0.98; P=<0.001) and vaccination status (AOR=0.17, 95%CI 0.05-0.58; P<0.01) remained significantly associated with invasive disease, after adjusting for gender, ethnicity, nursing home status, and Charlson’s score.

Conclusion: Patients with IPD were younger compared to those with non-invasive disease. Pneumococcal vaccination was associated with reduced risk of IPD and should be encouraged among high-risk groups.
Oral Presentations

O22. HIV SEROPREVALENCE, HEALTH SEEKING BEHAVIOURS AND SEXUAL RISK BEHAVIOURS IN MEN WHO HAVE SEX WITH MEN (MSM) IN SINGAPORE

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Background: To inform HIV control measures, we assessed the prevalence and correlates of behaviours of health-seeking and sexual-risk amongst MSM in Singapore. HIV seroprevalence was also measured.

Methods: Anonymous surveys were separately conducted in 2013 (n=1206), 2014 (n=1230) and 2016 (n=1267) at venues patronised by MSM. Rapid 3rd generation HIV screening tests were also administered. Adjusted prevalence ratios (aPR) were obtained by Poisson regression with robust estimates.

Results: The prevalence of screen-positive HIV declined from 2.5% in 2013 to 1.1% in 2016 (p-for-trend=0.01), with 63% reporting consistent use of condoms and 57% having had a recent HIV test (≤1 year) in 2016. Compared to non-users, drug users were more likely to have more than 5 sexual partners in the last year (aPR 1.62; 95%CI:1.15-2.35), and less likely to use condoms consistently (aPR 0.45; 95%CI:0.33-0.61). Recent HIV testing (≤ 1 year) was more prevalent in subjects who had more than 5 sexual partners in the last year compared to those with less (aPR 1.17; 95%CI:1.09-1.25). Favourable PrEP adoption attitude was more prevalent in those aged 25 years and below compared to those older (aPR 1.08; 95%CI:1.02-1.13), and in men with more than 5 sexual partners in the last year compared to those with less (aPR 1.10; 95%CI:1.05-1.15).

Conclusion: Compared with other countries during the survey years, HIV seroprevalence was low, and the uptake of condoms and recent HIV testing were comparable. Drug users had a higher prevalence of risky sexual behaviours. Pre-exposure prophylaxis could be further considered as part of a combination prevention strategy.
**Oral Presentations**

**O23. DIABETES AND SMOKING: A PRIMARY-CARE PREVALENCE STUDY**

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**Background:** Smoking is a risk factor for cardiovascular diseases and accelerates microvascular and macrovascular changes in diabetics. However, little is known about the prevalence of smoking among diabetics in Singapore. This study describes the smoking prevalence among diabetics at primary care clinics, and compares characteristics and risk factors between smokers and non-smokers.

**Methods:** We analysed 141,655 adults with diabetes who attended the National Healthcare Group Polyclinics (NHGP) in 2017. Data was obtained from the Chronic Disease Registry. They were categorised into: non-smokers, or ever-smokers (encompassing ex-smokers and current-smokers). Demographic characteristics, prevalent comorbidities and control indices (lipid profile, BMI, HbA1c and blood pressure) were compared. Chi-square or t-test was conducted for clinically significant differences.

**Results:** About 1 in 6 diabetics ever smoked: 9% (n=13,022) were current-smokers and 8% (n=11,353) ex-smokers. Diabetic current-smokers and ex-smokers were younger than non-smokers (mean age: 58±11, 63±12 and 65±12 years respectively). Malays had a higher ethnic-specific current smoker rate (12%) compared to non-Malays (9%). Relative to non-smokers, ever-smokers had higher age-adjusted prevalence ratios of chronic kidney disease (1.04), stroke (1.28), peripheral vascular disease (1.67) and heart disease (1.74). Triglyceride level was higher for ever-smokers than non-smokers (1.74 vs 1.53 mmol/L). Other indices were similar between the groups.

**Conclusion:** Amongst diabetics, 1 in 6 were ever-smokers, and they had higher prevalences of comorbidities and cardiovascular outcomes. Disease control indices were either similar or worse for diabetic ever-smokers. Continued efforts are needed to encourage younger or Malay diabetics to quit smoking, thereby reducing the risk of developing smoking-associated micro- and macrovascular complications.
O24. CASE SERIES: COMMON SYMPTOMS OF HEAT INJURY IN THE SINGAPORE ARMED FORCES (SAF)
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Background: Soldiers training in tropical climates are at risk of developing heat injuries. National guidelines describe the presentation of heat injuries as a composite of signs and symptoms, rectal temperatures and end-organ involvement. The objective of this study was to specifically examine early symptoms of heat injuries commonly seen in the Singapore Armed Forces (SAF).

Methods: Headquarters Army Medical Services Heat Injury Registry data from 2012 to 2017 was reviewed to specifically examine the presentation of heat injuries at the point of injury. Cases were stratified by eventual hospital diagnosis. Exposures of interest included time of injury, season and symptomology.

Results: A total of 364 soldiers who sustained suspected heat injuries were referred to hospital emergency departments from 2012 to 2017. A total of 231 and 32 soldiers were eventually diagnosed as having heat exhaustion and heat stroke respectively. 32.3% of heat injury cases occurred between 8 and 11 AM. 41.9% of heat injury cases occurred between the months of May and July. The most common symptoms for heat exhaustion cases were giddiness (42.9%), breathlessness (25.1%) and lethargy (22.5%). The most common symptoms for heat stroke cases were giddiness (40.6%), disorientation (34.3%), loss of consciousness (18.8%) and lethargy (18.8). The odds of a heat injury patient having disorientation was 2.32 times higher as a patient eventually classified as having non-heat injury (p= 0.0428, 95% CI= 1.05-5.12). Otherwise, heat injury and non-heat injury patient had generally similar symptomatic presentations.

Conclusion: Heat injuries within the SAF are more prevalent in the later part of mornings and between May to July. While specific symptoms alone might be insufficient to discern the eventual diagnosis, we have described their relative frequencies. We propose that these symptoms and their distribution be shared with the general public and emergency medical responders.
O25. MEASLES, MUMPS, RUBELLA (MMR) AND VARICELLA SCREENING AND VACCINATION PROGRAMMES IN TERTIARY HEALTHCARE INSTITUTIONS

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Background: Protection of healthcare workers (HCWs) against MMR and varicella is important to reduce the risk of nosocomial infections from vaccine-preventable diseases. It is postulated that the risk perception of occupational exposure, and hence the participation rate in catch-up screening and vaccination programmes, may differ between HCWs who manage primarily inpatients versus those who are in an ambulatory setting.

Methods: A retrospective review was conducted on the results of voluntary MMR and varicella catch-up programmes in a local tertiary hospital and tertiary dental centre implemented from 2017-2018. HCWs were screened for documentary evidence of serological immunity and/or vaccination for MMR and varicella. HCWs who were not immune against varicella were offered VZV IgG test, whereas those not immune against MMR were offered vaccination.

Results: 8,007 hospital HCWs and 449 dental HCWs were screened under the catch-up programmes, which represented participation rates of 90.5% and 98.0% respectively. Of those who participated, the positive seroprevalence rates of varicella were 93.5% in hospital HCWs and 92.4% in dental HCWs. 43.5% of hospital HCWs and 54.4% of dental HCWs did not have documented immunity against MMR. Of the total number of HCWs screened, 1.9% of hospital HCWs and 1.3% of dental HCWs were exempted from MMR vaccination due to medical contraindications.

Conclusion: Overall participation rate for screening was high and refusal rate for vaccination was low, which may reflect comparable occupational risk perception among the two HCW groups. The high positive seroprevalence against varicella also suggests a high level of herd immunity in our local population.
Background: Around 70% of cervical cancers are caused by types 16 and 18 of the human papillomavirus (HPV). Vaccines against HPV have been shown to be safe and effective in preventing HPV and cervical cancer. However, the uptake in Singapore remains low since its introduction to the National Immunisation Schedule in 2010 as a voluntary vaccination for females aged 9-26. The objective of this study was to explore the facilitators and barriers of HPV vaccination in women aged 18-26 in Singapore.

Methods: This was a qualitative descriptive study recruiting women studying in the National University of Singapore (NUS), aged 18-26 (N = 40). Maximum variation sampling was used to recruit participants from various socio-economic levels and faculties. Based on topic guides developed according to the socio-ecological model, in-depth interviews (IDIs) and focus group discussions (FGDs) were conducted. IDIs and FGDs were transcribed and coded using NVIVO11. Thematic data analysis was performed using an inductive approach.

Results: Barriers to HPV vaccination included lack of awareness, lack of perceived risk for cervical cancer, cost, lack of parental support, inconvenience, stigma associated with sexual activity, and concern regarding safety. Facilitators included parental encouragement, protection of health, lack of logistical barriers, and perceived safety and efficacy of the vaccine. Participants recommended increasing awareness of HPV vaccination and cervical cancer, reducing cost and making the vaccine compulsory as strategies to increase uptake.

Conclusion: A school-based national vaccination programme (such as those in Australia and the UK) is recommended to improve uptake of HPV vaccination in Singapore. This should be evaluated for cost-effectiveness and feasibility before implementation.
Background: Prediction of surgical risk pre-operatively is important for clinical shared decision-making and planning of health resources such as intensive care unit (ICU) beds. We previously described a surgical risk calculator, the Combined Assessment of Risk Encountered in Surgery (CARES), to predict postoperative mortality and need for ICU stay. In this study, we compared the performance of machine learning models against the CARES model, as well as the American Society of Anaesthesiologists-Physical Status (ASA-PS), an existing risk stratification tool.

Methods: All patients above 21 years old who underwent non-cardiac and non-neuro surgery at Singapore General Hospital (SGH) between 1 January 2012 and 31 October 2016 were included. Patient demographics, comorbidities, pre-operative laboratory results and surgery details were obtained from their electronic medical records. Outcome measures were 30-day postsurgical mortality and need for ICU admission (>24 hours). 70% of the observations were randomly selected for training, leaving 30% for testing. Baseline models were CARES and ASA-PS. Candidate models were trained using random forest, adaptive boosting, gradient boosting and support vector machine. Models were evaluated on area under the receiver operating characteristic curve (AUROC) and area under the precision-recall curve (AUPRC).

Results: A total of 90,785 patients were included, of whom 539 (0.6%) died within 30 days and 1145 (1.3%) required ICU admission post-operatively. Baseline models could achieve high AUROCs despite poor sensitivities by predicting all negative in a predominantly negative dataset. Gradient boosting was the best performing model with AUPRCs of 0.23 and 0.38, for mortality and ICU admission outcomes, respectively.

Conclusion: Machine learning can be used to improve surgical risk prediction compared to traditional risk calculators. AUPRC should be used to evaluate model predictive performance instead of AUROC when the dataset is imbalanced.
O031. BODY MASS INDEX CHANGES AND ITS IMPACT ON DISEASE BURDEN IN SINGAPORE
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Background: High Body Mass Index (BMI) is a risk factor for many chronic diseases. According to the Global Burden of Disease 2016, high BMI accounts for 6.8% of the total disease burden in Singapore. The Health Promotion Board has embarked on various programmes aimed at weight loss since the Health Promotion Master Plan (HPMP) 2012. This paper presents findings on BMI changes and its impact on disease burden in Singapore since the HPMP 2012.

Methods: Using data from the National Health Survey 1992 to 2010, a multivariable regression model with natural-logarithm of BMI against age, sex, race and year was fitted. The predicted log BMI values and the estimated standard deviation (using mean squared error) from the model, together with the demographic projections from the Department of Statistics were used to simulate the projected BMI distributions, which served as the hypothetical scenario without interventions. This was then compared to the observed BMI distribution obtained from the National Population Health Survey (NPHS) 2017. Using a Comparative Risk Assessment framework, the shift in the BMI distributions were then translated into Disability Adjusted Life Years (DALYs).

Results: The projected prevalence of obesity in 2017 was 11.3%, compared to the observed 8.7% seen in NPHS 2017. The differences in projected and observed BMI distribution translated to a 1.5 reduction in DALYs per 1000 people.

Conclusion: The comparison between projected and observed BMI distribution suggests that there is improvement in the BMI distribution since the HPMP 2012, which resulted in lower obesity prevalence, as well as a reduction of disease burden in Singapore.
O32. WITHIN-CATEGORY VERSUS ACROSS-CATEGORY LOWER-CALORIE LABELLING ON FOOD DEMAND: A CROSSOVER TRIAL (LOCAL)

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Background: In efforts to encourage healthier diets, Singapore's Health Promotion Board labels foods/drinks as “healthier” by comparing products within categories (e.g. within dairy drinks). A competing approach, like UK’s Traffic Light System, labels options as healthier by comparing across all products. This study is the first to test whether the within- or between-category approach has a greater influence on purchasing patterns and diet quality, using a customized ‘Lower Calories’ label. We hypothesized that within-category labelling would outperform the between-category approach, although both would outperform a no labelling strategy.

Methods: A 3×3 crossover randomized controlled trial involving actual purchases and deliveries was conducted. 146 participants were exposed to three shopping conditions in random order via an online grocery store. The three conditions (arms) were:

Arm 1) no logo labelling;
Arm 2) within-category labels (on the 20% of products within each product category with the lowest calories per serving), and;
Arm 3) across-category labels (on the 20% of products across all categories with the lowest calories per serving).

The proportion of labelled products purchased (primary outcome) and all secondary measures of diet quality were calculated using participants’ orders.

Results: The proportion of Lower Calorie products purchased was 10.6 percentage points lower in the across-category arm compared to the control arm (P < 0.01) and 13.6 percentage points lower compared to the within-category arm (P<0.01).

Conclusion: Results indicate that within-category lower calorie labels are more effective at influencing food purchasing patterns than across-category labels. This lends support to the Healthier Choice Symbol labelling strategy as currently applied.
O33. PATIENTS’ AWARENESS OF AND ATTITUDES TOWARDS ELECTRONIC HEALTH INFORMATION SHARING IN SINGAPORE

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Background: National Electronic Health Records (NEHR) in Singapore is an enabling platform to integrate medical records nationwide to support healthcare professionals to deliver seamless healthcare across different healthcare institutions a patient may visit for care. The NEHR system started in November 2011 and became available to all in 2013. It has increasingly extended its reach to both private and public healthcare organizations across Singapore. However, patient preferences and perspectives for sharing of such health information across institutions has not been examined in the local context. We undertook this qualitative study to understand how aware patients in Singapore are about electronic health information sharing and their attitudes towards it.

Methods: 34 patients with multiple chronic diseases were identified through purposive sampling, and were interviewed face-to-face using a semi-structured interview guide. All interviews were audio-recorded, transcribed and analysed thematically.

Results: The three important themes that emerged from the qualitative interviews are (1) Patient preference for common shared electronic health records across healthcare organizations (2) Unawareness of current information sharing through NEHR (3) Desire for more information and formal sharing of health records with patients.

Conclusion: The results revealed that patients are keen to access their health records and they want that their health records to be accessible by other hospitals and polyclinics too. These findings should allay concerns that healthcare institutions may have about data sharing, and encourage the addition of more patient health data into NEHR, as well as greater accessibility by patients.
Background: Taxi drivers are at high risk of chronic diseases and are hard to reach. Leveraging on a workplace health initiative carried out by Yishun Health at a local taxi depot between 2014 and 2017, we conducted a mixed-methods analysis to understand their health status and barriers and enablers of their health.

Methods: Quantitative analysis consisted of cross-sectional analysis of baseline health-screening data covering 2,597 participant drivers. Six focus group sessions involving 17 participants were audio-recorded and transcribed before being coded and analysed.

Results: 37.0% were obese and 42.2% more were overweight. Only 6.9% had ≥150 minutes of physical activity per week. 12.4% had known diabetes, with 19.1% more with fasting blood glucose ≥6.9 mmol/L. 23.1% had known hypertension, with 19.1% more having systolic or diastolic blood pressure ≥140 or 90 mmHg respectively. 23.3% had known hyperlipidaemia, with 20.4% more having LDL ≥4.1 mmol/L. Overall, 39.3% required new clinical follow-ups.

Focus groups highlighted the challenge of balancing health against pressure to drive long hours to cover high rental costs and increased competition with private hires. They highlighted that prolonged sitting, infrequent urination and inadequate hydration might also contribute to their increased prevalence of chronic diseases, kidney stones and musculoskeletal pain. There was also an emphasis on personal responsibility.

Conclusion: The high prevalence of chronic disease and large number requiring new clinical follow-ups matches their hard-to-reach perception and highlights the need for targeted interventions. There is a strong impetus to gain deeper insights into possible contributing factors to poor health in this occupational group.
**O35. A SINGLE-ARM FEASIBILITY STUDY OF GLYCOLEAP, A MOBILE LIFESTYLE MANAGEMENT PROGRAM FOR PEOPLE WITH TYPE 2 DIABETES**

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**Background:** Without successful interventions, the lifetime risk of developing Type 2 Diabetes (T2DM) in Singapore is forecasted to be one in two by 2050. Using relevant dimensions of the RE-AIM evaluation framework, this feasibility study assesses the effectiveness and potential scalability of GlycoLeap—a lifestyle management program for adults with T2DM delivered through a smartphone application—as an add-on to standard care in Singapore.

**Methods:** In this single arm trial, 100 T2DM patients were recruited from a community healthcare facility and provided 24-weeks of GlycoLeap intervention. Four dimensions of the RE-AIM framework were evaluated: (1) **Reach** (percentage who consented to participate out of all patients approached), (2) **Effectiveness** (percentage point change in HbA1c and weight loss), (3) **Implementation** (program fidelity as assessed by various participatory metrics), and (4) **Maintenance** (post-intervention user satisfaction surveys to predict the sustainability of GlycoLeap).

**Results:** 13.2% of patients approached (n=785) consented to participate (**Reach**). Preliminary results reveal that participants (n=70) achieved an average percentage point decrease in HbA1c of 1.3% and average weight loss of 1.9 kg (**Effectiveness**). On average, 14.4% of participants completed at least one online lesson, logged 1 blood glucose measurement, 1.9 weight measurements, 2 food logs, and sent 2.3 messages to their health coach weekly (**Implementation**). 74% of participants rated the app “good/very good” and 79% “would probably/definitely recommend” the app to others (**Maintenance**).

Conclusion: Preliminary results suggest clinically significant improvements in HbA1c levels and overall positive experiences with the app, supporting the recommendation to proceed with a randomized controlled trial of GlycoLeap.
O36. SCREENING FOR DIABETES WITH HBA1C: TEST PERFORMANCE OF HBA1C COMPARED TO FASTING PLASMA GLUCOSE AMONG CHINESE, MALAY AND INDIAN COMMUNITY RESIDENTS IN SINGAPORE

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Background: The prevalence of diabetes in Singapore, at 11.3% among adult residents, is high. A central strategy in reducing the population burden of diabetes lies in early detection and intervention. Current screening practice in Singapore recommends fasting plasma glucose (FPG), using a cut-off at 6.1mmol/l. Glycated haemoglobin A1c (HbA1c) has robust stability at ambient temperature and can be performed on non-fasted capillary blood samples, but the test performance of HbA1c in a screening setting is not well-characterized in Asian populations.

Methods: This study used data from the National Health Survey 2010 to compare HbA1c and FPG as diabetes screening modalities in 3540 community-dwelling non-symptomatic Singapore residents of Chinese, Malay and Indian race against a “gold standard” of oral glucose tolerance test with World Health Organization-recommended cut-offs.

Results: In the overall study population, the area under the receiver-operating characteristic curve (AUC) was higher for FPG compared to HbA1c, but this difference was not statistically significant. None of the differences in AUC between HbA1c and FPG for various age-race combinations were statistically significant, suggesting similar predictive accuracy. HbA1c cut-offs at 6.1%-6.3% performed similarly to FPG at 6.1mmol/l in terms of sensitivity (0.679-0.825) and specificity (0.903-0.969). Higher sensitivity at the expense of more false positives is preferable for screening, and a cut-off of HbA1c at >=6.1% seems reasonable. The positive predictive value of HbA1c at 6.1% would be 40-50% in the different age-race combinations, with a high negative predictive value of >98%.

Conclusion: HbA1c is an appropriate alternative to FPG as a first-step screening test for diabetes.
O37. HEALTHCARE BURDEN ASSOCIATED WITH CHILDHOOD OBESITY AND CHILDHOOD OVERWEIGHT: FINDINGS FROM GUSTO DATA IN SINGAPORE

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Background: The rising prevalence of childhood obesity is widely recognized to increase healthcare costs, but the economic consequences of childhood obesity in the Singapore context have been understudied. Moreover, the connections between childhood obesity and childhood health during early life are unclear. This work proposes using childhood adiposity status as an indicator of unhealthy lifestyles. Using data from the ongoing multi-ethnic GUSTO cohort in Singapore, we examined the additional healthcare burden associated with childhood obesity and childhood overweight during the period when children are aged 49-60 months.

Methods: Logistic regression and negative binomial regression are used to examine children's hospital admission, emergency hospital visits, non-emergency hospital visits, visits at polyclinics and visits to general practitioners.

Results: Overall, obese children are found to have more hospital admissions, and overweight children are found to have more non-emergency hospital visits. The effects are strong for Chinese children and Indian children, but not for Malay children. The mother’s socioeconomic status also affects the results. A household with an obese child is expected to incur SGD 363.6 more healthcare expenditures during the 1-year period for children aged 49-60 months. A household with an overweight child is expected to incur SGD 49.8 more.

Conclusion: Obese children and overweight children incurred additional healthcare burden as early as when they were between 49-60 month olds. Adiposity status can help identify children who are more likely living with unhealthy lifestyles. Children of Chinese and Indian ethnicities, as well as children with mothers of low socioeconomic status could be primary targets.
Background: NSFs in SPF assessed to have partial colour blindness (PCB) during pre-enlistment screening using Ishihara are not deployed to frontline roles, even if they are physically fit. In view of dwindling NSF numbers, Home Team Medical Services Division collaborated with SPF to design a trial to optimize deployment of NSFs with PCB.

Methods: Police organizations in some countries perform Farnsworth D15 assessments for officers with PCB to grade its severity. The test is based on arranging a set of coloured discs in the correct order of shades. For the first time in SPF’s history, this was conducted on 23 PES B1 PCB NSFs from the 170th SPF intake. Further scenario-based testing was conducted in Transport Security Command (TransCom) on 6 of the 23 NSFs.

Results: Of the 23 PES B1 PCB NSFs, 6 obtained Farnsworth D15 result of “Not Colour Blind”. The remaining were graded as slight in 3, moderate in 8 and strong in 6. 6 underwent scenario-based testing in TransCom: 2 not colour blind, 1 slight, 2 moderate and 1 strong. All accurately identified the suspect in their scenarios based on red/green shirt colours. Moreover, they correctly identified all surrounding officers wearing red/green shirt colours. This suggests that even NSFs with strong PCB on Farnsworth D15 can be deployed for frontline policing.

Conclusion: PES-fit PCB SPF NSFs can be safely deployed to frontline policing roles. This translates to a 3-5% increase in the pool of deployable NSFs.
Background: Paramedics, like healthcare workers, are continuously exposed to the occupational hazard of Hepatitis B infection. Vaccination is integral in protection against this oncogenic virus. Antibody to Hepatitis B surface antigen (anti-HBs) titre above 10mIU/ml is a marker of protection. Currently, Singapore Civil Defence Force (SCDF) paramedic trainees (PMTs) receive mandatory screening and vaccinations. Our study explores waning anti-HBs levels among a cohort of PMTs, follow-up booster vaccinations and rechecks.

Methods: Medical records of PMTs recruited between 2016-2017 were retrospectively reviewed. Demographics, Hepatitis B virus surface antigen (HBsAg) reactivity, anti-HBs titres and prior vaccination were studied. 17 PMTs born before Singapore’s national new-born vaccination program or had incomplete information were excluded.

Results: 93 PMTs with median age of 25 years were included. They were all previously vaccinated with 3 courses of primary hepatitis B vaccination. None were HBsAg positive. The distribution of PMTs by their anti-HBs titres were: <10mIU/ml (34), 10-100mIU/ml (16), >100mIU/ml (43). 5 of the non-immune PMTs who were given boosters and rechecked were noted to be anti-HBs <10mIU/ml again within 1 year.

Conclusion: A marked proportion of PMTs presented with waning immunity despite primary immunisation. Furthermore, there were slow- or non-responders requiring further boosters. They are all at risk of breakthrough infection. This brings into question the velocity and prevalence of anti-HBs decline and therefore, the optimal age/time-point for repeat screening in our high-risk population. Further research should be done to guide and optimise protection of all our at-risk pre-hospital providers.
P03. RETURNING INJURED WORKERS BACK TO WORK: PRELIMINARY OUTCOMES AFTER 1-YEAR IMPLEMENTATION OF A RTW PROGRAMME IN A PUBLIC HOSPITAL IN SINGAPORE

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Background: The Return to Work (RTW) Programme was launched nationwide in 2017. Within this programme, a RTW coordinator pro-actively liaises with stakeholders to negotiate suitable duties and develop RTW plans. This study investigates the preliminary outcomes of the RTW Programme in a public hospital 1-year post-implementation.

Methods: A prospective case series design was used. Subjects must have sustained a work-related injury, covered under the Work Injury Compensation Act and have more than 14 days of medical leave. Outcome measures include: time taken from injury to first RTW; RTW status and category of RTW; and self-perceived health status using the EQ-5D/5L.

Results: Between October 2017 and May 2018, 46 injured workers were recruited. Out of these, 46% are locals while 54% are foreign workers; 93% are blue-collared workers. To date, 22 subjects have returned to work, 18 subjects are in the midst of the RTW process and 6 have dropped out of the programme. Median time taken for RTW is 86 days (IQR: 62-113, n=22) from date of injury. At first RTW, 32% returned to their pre-injury job, 59% had modified job duties and 9% had a different job. There was also an improvement in self-perceived health status for 77% of the subjects.

Conclusion: Currently, 10 subjects have completed their programme and recruitment is still ongoing. Further data collection and analysis of outcome measures will be done by August for a larger sample size. The results of this study can help to determine the effectiveness of this programme in facilitating injured workers back to work.
**Po4. STRUCTURED TRAINING INCREASED SELF-PERCEIVED COMPETENCE AMONG HEALTH PROFESSIONALS TO BECOME RETURN-TO-WORK COORDINATORS IN PUBLIC HOSPITALS IN SINGAPORE.**

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*Tan Tock Seng Hospital, Singapore*

**Background:** A National RTW programme was launched in Singapore in November 2017. This led to the impetus of a training programme for health professionals to become return-to-work (RTW) coordinators. Ten competency domains of RTW were defined based on literature and a local randomised controlled trial. These ten domains were incorporated into the training programme. The objective of this study is to explore if structured training programme increases self-perceived rating of competence among health professionals as RTW coordinators.

**Methods:** A total of 28 participants consisting of occupational therapists, physiotherapists, medical social workers from public hospitals in Singapore attended two runs of the training programme. The training programme consisted of two pre-workshop online modules, a two-day workshop with case discussions and role-plays and post-workshop assignment. Participants were asked to self-rate their level of competence on a scale from 1 (limited competence) to 9 (proficient competence) in the ten domains pre- and post-workshop.

**Results:** At pre-workshop, the top three highest competency domains rated were knowledge of medical conditions (mean=5.93), interpersonal skills (mean=5.64) and communication skills (mean=5.46) while the three lowest competency domains were knowledge of legislation (mean=3.50), RTW facilitation (mean=3.96) and RTW focus (mean=4.21). At post-workshop, participants rated an increase of more than 45% in their self-perceived competence rating in the three lowest rated competency domains identified at pre-workshop.

**Conclusion:** Following this structured training programme, continuous learning through community of practice for these RTW coordinators would be beneficial to enhance their self-perceived competencies in managing the diversity of RTW cases.
IDENTIFYING JOB SATISFACTION FACTORS OF COMMUNITY-BASED THERAPISTS IN SINGAPORE

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Background: Around the world, the physiotherapy profession faces high attrition. Studies suggest that attrition may be due to various job satisfaction factors that differ across the continuum of care. However, there is scarce information on job satisfaction of therapists in community care. We sought to identify job satisfaction factors of occupational- and physio-therapists who were deployed across then-14 senior care centres (SCC) operated by St. Luke’s ElderCare. To do this, we used the job diagnostic survey, which was developed for job redesign in the public sector.

Methods: In Q4 2017, therapists self-administered the JDS (n = 40), scoring each item on a scale of 1 to 10. We collected these scores for analyses.

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Therapists indicated strengths in
1. Individual growth (s.6 and domain; Figure 1), through mean scores of 7.8 and 7.7;
2. Experienced psychological states (domain), through mean scores of 5.6.

They also indicated needs in
1. Having more responsibilities (s.3.4), through mean scores of 2.0;
2. Structured feedback and reflection (s.3.1/11), through mean scores of 3.0.

No significant differences were observed between clusters and centres.

Conclusion: Overall, individual growth and experienced psychological states (e.g. sense of meaning, social interaction etc.) are job satisfaction factors of community-based therapists. However, therapists can be enabled by having more structure in service delivery (Porter, 2017), through clear competencies, training, and progression.
Background: To inform employee health promotion efforts at a tertiary hospital, we reviewed biennial staff health screening results to assess the overall health status and areas for intervention. Aspects relating to cardiometabolic health are presented here.

Methods: A voluntary health screening programme was carried out from September to October 2017, involving anthropometric and biochemical measurements, and survey of health behaviours. Result comparison is made with the 2010 National Health Survey and past institutional health screening programmes.

Results: 5,152 of 9,177 (56.1%) healthcare workers (HCW) participated in the programme. Of the participants, 16.6% have at least two or more cardiovascular risk factors. We observed lower prevalence of diabetes mellitus (3% vs 11%) and hypertension (16% vs 24%) compared to the 2010 national rates after age-standardisation. Between 2011 and 2017, there is an increase in median BMI (22.7 kg/m² to 23.5 kg/m²), crude obesity rates (9.8% to 14.5%) and prevalence of dyslipidaemia (11.5% to 17.3%). Only 35.5% of participants report attaining more than 600 MET-minutes of physical activity per week. Up to 41% of HCWs consume at least one meal within hospital-based food outlets.

Conclusion: The findings are limited by use of a convenience sample and a suboptimal participation rate, and likely underestimate prevalence of health risk factors. Nevertheless, the findings indicate that rising obesity and dyslipidaemia are issues of concern. Increasing opportunities for workplace health promotion, specifically physical activity and dietary intervention, remain essential to effect lasting health behavioural modification.
**P07. EFFECTIVENESS OF VOICE CARE WORKSHOPS FOR TEACHERS**

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**Background:** Extensive research has shown increased prevalence of voice disorders among teachers (Roy et al. Journal of Speech Language and Hearing Research 2004;47(3): 542). Voice disorders can have serious consequences including occupational absenteeism and occupation changes (Da Costa et al. Journal of Voice 2012;26(1): 69-76). Paying attention to voice care can prevent voice disorders (Bovo et al. Journal of Voice 2007; 21(6): 705-722) but few studies have evaluated the effectiveness of different voice care service delivery models. The aim of this study is to evaluate the relative effectiveness of three different preventive voice care workshops, compared to a control group, for improving kindergarten teachers’ vocal quality: Video (Group VI), Group (Group GR) and Video plus Group (Group BL).

**Methods:** All three experimental workshops lasted about 1 hour and were conducted within the participants’ own kindergartens. Each workshop provided information about indirect (general vocal hygiene information) and direct (suitable vocal function exercises and vocal modifications) preventive approaches. The volunteer kindergarten teachers were allocated into one of four workshop groups: Group VI (content delivered via a prepared video), Group GR (content delivered via a group workshop), Group BL (content delivered via a prepared video and a group workshop) and Group CON (no content delivered during the study). Baseline and outcome measures include objective acoustic measures (jitter, shimmer, noise-to-harmonic ratio, maximum phonation time and s/z ratio) as well as subjective measures of vocal quality.

**Results:** The results of a series of 2-way mixed ANOVAs are expected to reveal: significant improvement in all outcome measures for the experimental groups compared to the control group, with Group BL and Group GR each > Group VI.

**Conclusion:** The effectiveness of voice care workshops depends on the service delivery model.
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Po8. AETIOLOGY AND ANTIBIOTIC SUSCEPTIBILITY PATTERNS OF URINARY TRACT INFECTIONS IN THE PRIMARY CARE SETTING IN SINGAPORE

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Background: Urinary tract infections (UTI) are frequently encountered in primary care. Our study presents the aetiology and antibiotic susceptibility patterns of uropathogens, as well as prescribing patterns of physicians in the Singapore primary care setting.

Methods: Prospective cohort study conducted in three public primary care polyclinics in Singapore from 2015 to 2016. Study participants were adult male and female patients presenting with UTI-related symptoms and confirmed to have UTI using urine culture. Descriptive statistics were used to report the characteristics of the cohort, the incidence and antimicrobial susceptibility patterns of uropathogens identified, and appropriateness of treatment by matching prescribed antibiotics with susceptibility patterns of isolates.

Results: Of 299 participants, 259 (86.6%) were females. The mean age was 60.8 +/- 17.3yrs. The most common uropathogen detected was Escherichia coli (75.5%). Enterobacteriaceae isolates were highly susceptible to amoxicillin-clavulanate, ceftibuten, fosfomycin and nitrofurantoin, but >20% were resistant to ciprofloxacin and co-trimoxazole. Two hundred and eighty-three patients were empirically prescribed antibiotics. The most common antibiotics given were amoxicillin-clavulanate (62.5%), ciprofloxacin (27.2%) and co-trimoxazole (5.7%). Amoxicillin-clavulanate was found to be appropriate 87.6% of the time, followed by nitrofurantoin (87.5%) and ciprofloxacin (76.6%).

Conclusion: Amoxicillin-clavulanate remains the antibiotic of choice for empirical therapy, although this was prescribed to a relatively low proportion of patients. Ciprofloxacin and co-trimoxazole are not recommended for use without cultures to guide treatment. Other lesser used options like nitrofurantoin and fosfomycin should also be considered for treatment. Updated clinical practice guidelines would help guide primary care physicians on recommended clinical practices.
P09. ASSESSMENT OF THE RISK POSED TO SINGAPORE BY THE EMERGENCE OF ARTEMISININ-RESISTANT MALARIA

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Background: To assess the public health risk to Singapore posed by the emergence of artemisinin-resistant malaria across the Greater Mekong Sub-region (GMS).

Methods: The likelihood of importation of drug-resistant malaria into Singapore and the impact on public health of its subsequent secondary spread in Singapore were assessed to determine the overall risk. Literature on the epidemiology and contextual factors associated with artemisinin-resistant malaria was reviewed. Epidemiology of malaria cases in Singapore was analysed. Vulnerability and receptivity of Singapore were examined, including the connectivity between Singapore and countries reporting artemisinin resistance (ART-R), as well as preparedness of Singapore health authorities.

Results: The importation of ART-R malaria in Singapore is possible given the close proximity and significant travel volume between Singapore and the GMS countries reporting ART-R. Singapore’s vulnerability is further enhanced by its high dependency on foreign workers from neighbouring endemic countries. Nonetheless, the overall likelihood of such an event is low based on the rarity and decreasing trend of imported malaria incidence over the past few years.

With the presence of Anopheles vectors in Singapore, imported cases of drug-resistant malaria can cause secondary transmission. Nevertheless, the risk of sustained spread is likely to be mitigated by the comprehensive surveillance and control system in place for both vector and human cases.

Conclusion: This risk assessment highlights the need for a high degree of vigilance over the local and global situation to be maintained to minimise the risk and severity of the public health threat of drug-resistant malaria to Singapore.
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**P10. EVALUATING THE EFFECTIVENESS OF THE INFLUENZA VACCINE DURING RESPIRATORY OUTBREAKS IN SINGAPORE’S LONG TERM CARE FACILITIES, 2017**

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*Ministry of Health, Singapore*

**Background:** Influenza outbreaks occur periodically in Long Term Care Facilities (LTCFs) and vaccination is critical in preventing influenza infections. We evaluated the influenza vaccine effectiveness (VE) during respiratory outbreaks in LTCFs reported to the Ministry of Health, Singapore in 2017.

**Methods:** A test-negative design was used to estimate the ratio of the odds of testing positive for influenza among vaccinated individuals to the odds among unvaccinated individuals. The VE was calculated as (1-odds ratio) x 100%. For adjusted VE, the estimates were derived using logistic regression adjusted for age group, gender, month of illness, and number of days from date of illness onset till to swab collection date. Estimates by influenza subtypes and post-vaccination time periods (15 - 180 days & 181 - 365 days) were also calculated using stratified data.

**Results:** 264 individuals, with 118 laboratory-confirmed influenza cases [32 A(H1N1)pdm09, 75 A(H3N2), 11 A(untypable), 0 B], were included in the analysis. The overall adjusted VE estimate was 40.5% (95% CI: -12.2 - 68.5%), while the subtype-specific adjusted VE estimates were -43.4% (95% CI: -312.4 - 50.2%) against A(H1N1)pdm09 and 57.1% (95% CI: 5.7 - 80.5%) against A(H3N2). At 15 - 180 days post-vaccination period, the adjusted VEs were 59.3% (95% CI: 18.0 - 79.8%) against all influenza, 35.4% (95% CI: -123.5 - 81.3%) against A(H1N1)pdm09 and 67.9% (95% CI: 22.5 - 86.7%) against A(H3N2). Estimates were not significant at 181 - 365 days post-vaccination.

**Conclusion:** Overall, the influenza vaccine was moderately effective in Singapore’s LTCFs in 2017. It remains an important tool in preventing influenza infections, especially for those who are at high risk of influenza-related complications.
Background: The objective of the study is to analyze the temporal trends in pneumonia morbidity and mortality in between 1992 and 2016. It aims to summarise the changing magnitude of pneumonia as shown by the mortality and morbidity indicators.

Methods: Pneumonia ED admission rates, hospitalization rates and mortality rates were derived. Age-standardisation of rates or proportions, where possible, were calculated by the direct method, using the WHO world population as the standard population. Trends of age-standardised rates were analyzed with polynomial models. We also examined the trends of the median length of stay of patients who were hospitalised with pneumonia and the proportion of hospitalisations that required intensive care unit (ICU) admissions.

Results: The age-standardised rates of pneumonia hospitalisation increased by 70%, from 198 per 100,000 population in 1992 to 335 per 100,000 population in 2016. The crude ED admission rates have also increased gradually in recent years, from 233 per 100,000 population in 2012 to 278 per 100,000 population in 2016. The age-standardised mortality rates of pneumonia decreased from 63 per 100,000 population in 1992 to 55 per 100,000 population in 2016.

Conclusion: The burden of hospitalisations due to pneumonia has increased in recent years due to the rapidly aging population. On the other hand, the pneumonia mortality rates seemed to have plateaued. Beyond an actual increase in pneumonia hospitalisations, the increase reported may have many other potential explanations, including changes in admission practices (e.g. admitting lower severity cases), changing patterns in diagnostic coding and changes in preferred codes.
P12. SINGAPORE TUBERCULOSIS ELIMINATION PROGRAMME CONTACT SCREENING PERFORMANCE, 2000-2017

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**Background:** Since 1998, nation-wide screening of close contacts of infectious tuberculosis (TB) cases (i.e. AFB smear/culture positive index) to identify active disease and latent TB infection (LTBI) has been implemented by the Singapore Tuberculosis Control Unit (TBCU) as one of the key interventions of the Singapore Tuberculosis Elimination Programme (STEP).

**Aim:** To evaluate the performance of the national contact screening programme (2000-2017).

**Methods:** The following indicators which are captured electronically into the STEP Contact Registry were evaluated:

1. Index cases with index interview done
2. Contacts identified and who attended screening
3. Contacts who completed screening
4. Smear positive index cases with at least one contact and four contacts screened
5. Active TB cases detected during contact screening
6. LTBI detected during contact screening
7. Eligible contacts commenced on LTBI treatment
8. Contacts who completed LTBI treatment

**Results:** The number and % of index with index interview done increased from 729 (65%) to 1,371 (88.5%). The number of contacts identified increased from 5,121 to 15,579, with 4,794 (94%) and 12,614 (81%) attended screening respectively. The number and % of contacts who completed screening increased from 3,326 (73.7%) to 11,130 (96.6%). The smear positive index case with at least one contacts and 4 contacts screened increased from 256 (70.7%) to 631 (85.3%) and 142 (39.2%) to 446 (60.3%) respectively. There were 30 to 98 cases (0.5% to 1.1 %) of active TB were picked up each year from contact screening. Between 2000 and 2016, 87%-97% of contacts with LTBI were started treatment. Among these, 74%-82% completed their treatment.

**Conclusion:** The national contact screening performance has improved from 2000 to 2017.
P13. FACTORS ASSOCIATED WITH ANTIBIOTIC PRESCRIBING FOR UPPER RESPIRATORY TRACT INFECTIONS AT AN ADULT EMERGENCY DEPARTMENT

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Background: Substantial emergency department (ED) attendances are contributed by patients with uncomplicated upper respiratory tract infections (URTIs). Most URTIs have a viral aetiology yet a significant proportion are prescribed antibiotics. Antibiotics have adverse effects and their misuse promotes antimicrobial resistance. We aim to determine clinical and non-clinical factors influencing antibiotic prescribing for uncomplicated URTIs.

Methods: We conducted a cross-sectional study using a self-administered questionnaire on ED doctors at an adult tertiary hospital from June 2016 - September 2017. Factor analysis was performed on the questionnaire responses to derive the latent factors, which were then analysed by multivariable logistic regression.

Results: Of 145 ED doctors, 40.1% reported managing URTI in 30-50% of patients in a typical workday. Almost half (47.2%) reported low antibiotic prescribing rates of <10%. After adjusting for designation and place of medical education, doctors who perceived that antibiotic prescribing practices did not require improvement at both the individual and departmental levels (OR 1.67, 95%CI 1.10-2.52) were more likely to report low prescribing rates. Conversely, doctors who perceived that their patients expected antibiotics (OR 0.57, 95%CI 0.37-0.87) or who had the propensity to prescribe antibiotics (OR 0.47, 95%CI 0.31-0.71) were less likely to report low prescribing rates. Additionally, doctors who perceived that antibiotics were clinically indicated for their patients were less likely to report low prescribing rates (OR 0.65, 95%CI 0.43-1.00).

Conclusion: Besides clinical indications, a doctor’s intrapersonal factors determined the antibiotic prescribing practices for URTI. Elucidating accurate perceptions of patients’ expectations and focusing on holistic care of the patient will encourage optimal antibiotic prescribing.
Background: Diabetes Mellitus (DM) is a growing epidemic in Singapore. Information on its economic burden remains limited. We aim to assess cost of Type 2 DM (T2DM) and identify cost drivers.

Methods: This was a prevalence-based cost-of-illness study on 327 patients who attended Diabetes Centre in a local hospital in 2015-2017. Direct medical costs included hospital inpatient, outpatient and emergency department (ED) visits. Direct non-medical costs referred to costs incurred by informal care-giving. Indirect costs referred to productivity losses from absenteeism and presenteeism calculated with human capital approach. Intangible costs were expressed as quality of life where health utility scores and Visual Analog Scale (VAS) derived from EuroQol (EQ) 5D.

Results: The mean and median annual total costs were S$6,747 (±11,117) and S$2,630 (IQR 1,507-6,959) respectively. Direct medical cost, direct non-medical cost and indirect cost accounted for 69.2%, 3.2% and 27.6% of total cost. Inpatient, outpatient and ED visits accounted for 46.7%, 46.1% and 7.2% of direct medical costs. The mean EQ-5D index and ED-VAS scores were 0.89 (±0.19) and 70.2 (±16.1) respectively. Patients with kidney, eye and cardiovascular complications had 94.0% (p=0.009) and 83.4% (p=0.021) and 72.3% (p=0.077) higher total costs than those without the respective complications, having adjusted for demographics, DM duration, HbA1c and medications.

Conclusion: Direct cost was a major contributor of the total cost. The cost of caregiving is considerable and suggests that DM imposes a significant caregiving burden. Intensive efforts should be made to prevent DM complications in order to reduce costs of DM.
**P15. ESTIMATION OF DIABETES INCIDENCE AND ITS RELATED RISK FACTOR IN SINGAPORE**

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*Ministry of Health Singapore*

**Background:** As part of the War on Diabetes (WoD), there is a need to be informed of the epidemiology of diabetes mellitus (DM) in Singapore. However, there have been little local data on DM incidence. This paper presents the estimated diagnosed DM incidence and findings on the association with selected risk factors using data from the National Health Survey (NHS), SPH’s Multi Ethnic Cohort (MEC) and administrative health records.

**Methods:** Newly diagnosed DM cases were identified by following up survey respondents who did not have DM at the time of survey with administrative health records. The incidence rates were computed by dividing the number of new cases with total follow-up time. A Cox’s proportional hazards regression analysis was conducted to assess the effect of selected risk factors on diagnosed DM incidence, after adjusting for potential confounding factors.

**Results:** On average between 2011 and 2016, the overall weighted incidence rate derived from MEC for people aged 21 to 70 at baseline was 7.96 (95% CI: 7.08-8.83) per 1,000 person per year while the estimate from NHS2010 was 6.63 (95% CI: 5.51-7.75) per 1,000 person per year between 2010 and 2016. The risk factors associated with higher hazard of being diagnosed with DM were older ages, higher body mass index, lower educational level and individuals with hypertension at baseline.

**Conclusion:** Singapore’s incidence rates were similar to that of Taiwan’s (8.0 in 2007) and US’s (6.7 in 2015) but higher than UK’s. It is important to monitor the rates to track the progress of WoD.
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P16. INCIDENCE AND RISK FACTORS OF PERIPHERAL VASCULAR DISEASE AND PERIPHERAL NEUROPATHY AMONG TYPE 2 DIABETES MELLITUS PATIENTS AT PRIMARY CARE CLINICS IN SINGAPORE

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Background: In patients with type 2 diabetes mellitus (T2DM), peripheral vascular disease (PVD) and peripheral neuropathy (PN) may escalate to infected ulcers and lower extremity amputation. Regular diabetic foot screening (DFS) for T2DM patients can detect PVD and PN early. This study aims to estimate the incidence of PVD and PN at interval screening and identify significant risk factors.

Methods: This is a retrospective cohort study using DFS data from the National Healthcare Group (NHG) diabetes registry. We included adult T2DM patients (n=70,461) with at least 2 DFS from 2014 to 2017 who had absence of PVD, PN, ulcer, amputation and cellulitis at first DFS. The incidence rates were estimated for entire cohort and different subpopulations. Poisson regression was conducted to identify significant factors.

Results: The overall incidence rate (IR: per 1000 person-years) of PVD was 11.1 (95%CI 10.7 - 11.7) and higher among patients with foot dryness (IR: 73.6) and nephropathy (IR: 52.5). For PN, overall IR was 7.2 (95%CI 4.8 - 7.6) and highest among those with nephropathy (IR: 23.5) and paraesthesia (IR: 21.2). Older age, Indian race, smoking, longer DM duration, poor HbA1c control, diabetic nephropathy, claudication, paraesthesia, foot and nail problems, and skin dryness were significant factors contributing to both PVD and PN. Female gender, foot deformity and higher BMI increased the risk of PVD while AMI and IHD increased PN risk.

Conclusion: DFS screening can detect foot problems for early intervention. Patients with significant risk factors should be scheduled for regular DFS to detect early PVD and PN.
**P17. RISK ASSESSMENT TOOLS FOR DETECTING UNDIAGNOSED DIABETES**

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**Background:** Diabetes and its complications account for 14% of the total disability-adjusted life years making it the third largest contributor to overall disease burden in Singapore. Currently 400,000 are known diabetic but 1 in 3 living with diabetes are undiagnosed. Early screening and intervention, which sees 50% of individuals achieving normal glucose levels after 1 year, are important to prevent or delay the onset of diabetes. Traditionally, diabetes screening in Singapore starts at 40 years old. To shift preventive efforts further upstream, the Diabetes Risk Assessment (DRA) was developed for use by individuals aged 18-39 years old.

**Methods:** Based on the Health Belief Model in that a health-related action will be taken by an individual if a negative health condition can be avoided, the DRA, consists of 5 questions, was designed to encourage individuals assessed to be at high risk of being diabetic to take further action. A high risk assessment entitles the user to be invited for diabetes screening at highly subsidised rates.

**Results:** In the 6 months since its launch, the DRA was used 146,000 times and 17% were assessed to be at high risk with 3,000 users registering their results and invited to go for health screening. Of these, only 7% (220) went for health screening, even after reminders to go for screening. Repeated reminders improved response by 3% since its launch.

**Conclusion:** HPB is conducting a study to understand the reasons for attrition post DRA completion, in an effort to improve the DRA user experience and motivate individuals who were assessed to have high risk to go for health screening. HPB is also exploring opportunistic rollout of DRA for persons whose 1st degree family member has diabetes, and would like to discuss the pros and cons of this effort in the presentation.
P18. UNDERSTANDING THE USE OF COMPLEMENTARY AND ALTERNATIVE MEDICINES IN TYPE II DIABETIC PATIENTS
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Background: Chronic disease management is challenging owing to the need for lifelong medications and extensive changes to patients' lifestyles. As a coping mechanism, some patients choose complementary alternative medicines (CAM) to supplement this management. This is a concern because of potential drug-herb interactions and conflicting evidence on effectiveness of CAM. While past local studies estimated CAM use ranging from 25%- 90%, little is known about the underlying determinants of patients' decision to using CAM. We aim to understand CAM use among type II diabetic patients on their motivations, perceptions and willingness to engage with their Western healthcare providers (WHCP).

Methods: A mixed-methods study was conducted among 402 Type II diabetes mellitus patients, representative of the prevalence in local ethnic distribution, recruited from the Saw Swee Hock School of Public Health's Singapore Population Health Study cohort.

Results: We found that 181(45.0%) patients use at least one form of CAM in diabetes management, with only 20.8% of CAM users informing their WHCP. Patients did not reveal CAM use because they were not prompted, thought it irrelevant or were afraid of being stigmatized by their WHCP. Furthermore, CAM users scored lower in diabetic knowledge compared to non-CAM users (OR=0.928, p=0.0459), despite reporting higher quality of life (OR=1.104, p=0.0358).

Conclusion: CAM use is highly-prevalent among patients but not highly-visible to Western physicians. These findings point to the essential role for Western physicians in resolving a large communication gap that at best, results in wasted resources and at worst, may actively harm patients through conflicting care recommendations.
**Poster Presentations**

**P19. ASSOCIATION OF SOCIAL AND PSYCHOLOGICAL FACTORS WITH MEDICATION NON-ADHERENCE IN POLYCLINIC PATIENTS WITH TYPE II DIABETES: A CROSS-SECTIONAL STUDY**

Premikha M1, A J Leung1, Joey Y.L. Tan1, ML Feng2, ZP Zhang3, K Venkataraman2

1 Yong Loo Lin School of Medicine, National University of Singapore; 2 Saw Swee Hock School of Public Health, National University of Singapore, 3Choa Chu Kang Polyclinic, National University Polyclinics

**Background:** Type II Diabetes Mellitus (T2DM) is one of the leading chronic diseases in Singapore. While effective and affordable pharmaceutical agents are available, global studies suggest that medication adherence is still suboptimal. Therefore, this study was conducted to assess the local prevalence of medication non-adherence in primary care, and the association of social and psychological factors with medication non-adherence.

**Methods:** This was a cross-sectional, questionnaire-based study of 621 patients from Choa Chu Kang and Bukit Batok polyclinics. The questionnaire captured patients’ biodata, diabetes profile, medication profile, subjective medication adherence (Morisky-Green-Levin Medication Adherence Scale), social support (Functional Social Support Questionnaire) and psychological well-being (Problem Areas in Diabetes Questionnaire).

**Results:** The mean age of participants was 60.93 (SD=9.313) years; 340 (54.8%) were males, 377 (60.7%) were Chinese, 152 (24.5%) were Malays and 80 (12.9%) were Indians. Non-ideal adherence was reported by 368 (59.3%) participants. On multivariate analysis, younger age (40-49 years vs ≥70 years OR=2.22, 95% CI=1.00-4.93; p<0.05), peripheral neuropathy (OR=2.29, 95% CI=1.48-3.56; p<0.001), not having home glucose monitoring (OR=0.64, 95% CI=0.45-0.92; p=0.01), and lower psychological well-being (OR=1.02, 95% CI=1.01-1.03; p<0.001) were significantly associated with non-ideal adherence. Surprisingly, social support (p=0.957) was not associated with non-adherence in this population.

**Conclusion:** The prevalence of medication non-adherence was similar to other studies conducted locally and regionally. Patients with higher psychological distress were more likely to be non-adherent to medication, suggesting a need for healthcare providers to enhance psychological support for patients to improve their well-being, and increase medication adherence.
Background: Atrial fibrillation (AF) is the most common clinically significant heart rhythm disorder and a growing disease burden around the world due to a rapidly aging population. We propose that a user-centric approach will allow us to chart the dimensions of features in an electronic-tool (e-tool) that patients will find useful for monitoring and managing their own condition to obtain optimum outcomes.

Methods: Semi-structured qualitative interviews with healthcare providers (HCPs) and patients were conducted to triangulate interpretations and expectations needed for self-management and efficacy in an e-tool. Thematic analysis was applied to interviews to discover emergent themes and infer ideas of preferred features in a device.

Results: HCPs generally concurred that an e-tool was useful in helping AF patients better access disparate knowledge among different age groups and conditions, and to keep track of the potentially fluctuating condition of AF that is intrinsically linked to diet and medication. Patients emphasized convenience and the intuitiveness of features, such as the portability of a device and the language accessibility of the e-tool. Interviews suggested patients did not proactively try to look for additional information regarding their condition if they are already relying on physicians’ advice.

Conclusion: Whereas HCPs’ views of e-tools were centered around knowledge management, patients’ understanding revolved around comfort, ease and accessibility of the e-tool. We find that while e-tools may serve as a catalyst in motivating self-management in patients, a user-centric approach to e-tools design may reveal differences in what various stakeholders desire and allows us to meet those needs more effectively.
P21. THE ROLE OF TRIGLYCERIDE-GLUCOSE INDEX IN DEVELOPMENT OF HYPERTENSION - FINDINGS FROM A COMMUNITY COHORT

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Background: Triglyceride-glucose (TyG) index is a recently emerging surrogate marker of insulin resistance. We aim to investigate the role of TyG index in development of hypertension and elucidate the mechanism for the relationship.

Methods: 3183 subjects without baseline hypertension participated in a community screening programme in 2013-2017. Hypertension is defined as systolic blood pressure ≥ 140mmHg, diastolic blood pressure ≥ 90 mmHg, self-reported hypertension or use of anti-hypertensive medications. Cox proportional-hazard model was used to assess association between risk of incident hypertension and TyG in quartiles, adjusting for demographics, clinical characteristics and medications. Binary mediation was done to examine the extent of mediation on the relationship between body mass index (BMI) and incident hypertension by TyG index.

Results: Hypertension developed in 363 subjects. Those who developed hypertension had higher TyG (8.6±0.5) than those who did not (8.4±0.5) (p<0.001). Quartiles 3 and 4 of TyG remained independent risk factors for incident hypertension after full adjustment with hazards ratios 2.89 (95%CI 1.16-7.18) and 3.12 (1.18-8.25) respectively. The area-under-curve for TyG alone was higher than that for triglyceride and fasting plasma glucose (62.6% versus 61.0% and 61.6% respectively, p<0.001). Increasing TyG index accounted for 27.6% of the association between increasing BMI and incident hypertension, having adjusted for age and gender (p<0.001).

Conclusion: TyG is potentially useful for predicting hypertension in clinical practice. It is a potential mediator of association between BMI and incident hypertension.
P22. FACE-TO-FACE VS NON FACE-TO-FACE PROGRAMME DELIVERY TO REDUCE OBESITY AMONG SCHOOL CHILDREN

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Background: Childhood obesity is a growing international issue. To improve students’ (aged 7 to 17) weight status and lifestyle behaviours, Health Promotion Board (HPB) has since 2012 implemented school-based face-to-face (F2F) physical activity and lifestyle coaching programmes for overweight students and their parents. Due to students’ and parents’ competing priorities, non-face-to-face (NF2F) programmes was introduced in 2017 to enable “anywhere, anytime” coaching at their convenience. This paper compares the effectiveness of F2F and NF2F approaches.

Methods: Compared to the F2F approach, NF2F had more touchpoints through either phone or app-based coaching with personalised nudges, bite-sized tips and behaviour tracking. The difference between students’ BMI at the start of each school year in 2017 and 2018 was used to evaluate effectiveness of each approach. BMI difference and mean BMI and weight change between students who participated in F2F and NF2F, respectively, were compared.

Results: 3540 students participated in F2F programmes, of which 38.3% achieved >0.5 BMI point reduction or acceptable weight status. In comparison, 4044 students participated in NF2F programmes, of which 47.7% achieved >0.5 BMI point reduction or acceptable weight status. Of students who remained overweight, mean BMI and weight change were -1.52 and -0.56kg, and -1.51 and -0.70kg for F2F and NF2F, respectively.

Conclusion: The NF2F approach had a higher proportion of students improving weight status compared to the F2F approach, attributable to more frequent engagement and personalisation through phone and app-based coaching. To further improve effectiveness, the next step is to incorporate NF2F features to the F2F approach.
**P23. OVARIAN CANCER INCIDENCE IN SINGAPORE 1968-2010**

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**Background:** Ovarian cancer is a serious, often lethal condition, and many countries around the world have reported rising incidence rates. We investigate ovarian cancer incidence between 1968 and 2010 in Singapore.

**Methods:** Aggregated data of ovarian epithelial cancer numbers and estimated person-years from 1968 to 2010 were obtained from Singapore Cancer Registry, stratifying by ethnicity and cancer subtype. Age-Period-Cohort modelling was performed.

**Results:** Overall, age-standardised incidence rate of ovarian cancer approximately doubled, from 5.8 to 12.2 per 100,000 per year from period 1968-1972 to 2008-2010, while the age-standardised mortality rate remained stable. This increase was higher among Malays (5.1 to 13.6 per 100,000 per year), compared to Chinese and Indians. Serous carcinoma showed the greatest increase in incidence from 0.4 to 3.4 per 100,000 per year. Period effects were seen in Chinese women, while the age-drift model appears to best describe ovarian cancer trends in Malay and Indian women. Clear cell and mucinous carcinoma subtypes were more common in Chinese than Malay and Indian women. Stage at diagnosis for the years 2003-2010 differed by subtype, with most serous carcinomas presenting at late stage while the majority of clear cell and mucinous carcinomas presenting earlier.

**Conclusion:** Ovarian cancer incidence rates have approximately doubled in 40 years in Singapore. The relatively late presentation of serous carcinomas argues for the need to increase awareness of ovarian cancer early symptoms in the public.
Background: To compare eye shape across the refractive error range using brain magnetic resonance imaging (MRI) images in Singapore adults.

Methods: A total of 450 participants aged 60 years and above (64.2±6.5 years old) in the Singapore Epidemiology of Eye Disease (SEED) study were included. The MRI volumes of the right eye were semi-automatically segmented in the axial planes, and posterior eye radius of curvature (Rc) (related to total eye volume) and asphericity (Qxz with >0 as oblate, <0 as prolate) were calculated.

Results: Among 441 eligible subjects, the prevalence of myopia (-0.50 Diopter(D)>SE) and high myopia (-5.00D>SE) were 25.6% and 3.6%, respectively. Both larger eye volume and prolate eye shape were correlated with longer AL and worse SE. Multivariable regression analysis revealed that larger eye volume was associated with worse SE (B= -1.8, 95% confidence interval (CI) -2.3 to -1.3, p<0.001), longer

Conclusion: We have demonstrated that eye volume and the prolate eye shape were associated with myopic eyes, and that the prolate changes of myopic eyes become more prominent in the group with high myopia.
P25. RAPID HTA ON SELECTIVE LASER TRABECULOPLASTY FOR OPEN ANGLE GLAUCOMA

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Background: Patients with chronic open angle glaucoma (COAG) may be managed by medication (eye-drops) or by surgery. In cases unsuitable for medication or surgery, selective laser trabeculoplasty (SLT) may be done. A rapid health technology assessment was done to inform our hospital’s decision on offering SLT as a mainstream service. The PICO elements were:
- Population - COAG patients
- Intervention - SLT
- Comparator - Argon laser trabeculoplasty (ALT) or Medication
- Outcomes - Adverse effects, clinical outcomes including reduction in intraocular pressure (IOP)

Methods: Databases (NHS-CRD, Cochrane, MEDLINE, NGC) were searched for systematic reviews, HTA reports and clinical practice guidelines. Systematic reviews were critically appraised using the AMSTAR (Assessing the Methodological Quality of Systematic Reviews) checklist. Findings from the systematic reviews were summarised in a narrative synthesis.

Results: Six systematic reviews covering nine randomised controlled trials (RCTs) found that SLT was not inferior to ALT in terms of risk of uncontrolled IOP at one-year follow-up; reduction of IOP at up to 5 years; reduction in number of glaucoma medications; and side effects. Eight systematic reviews covering four RCTs (and one prospective non-randomised trial) indicated that SLT compared to medication showed no difference in reduction in IOP up to 5 years. In general, SLT is a safe procedure, and serious complications are rare. The more common adverse events are transient and without sequelae and may be treated with medication.

Conclusion: SLT is a mainstream treatment option for COAG. The decision on introducing SLT would depend on budget impact and sufficient workload to justify providing the service.
P26. PREVALENCE, RISK FACTORS AND IMPACT OF MYOPIC MACULAR DEGENERATION ON VISUAL IMPAIRMENT AND FUNCTIONING AMONG ADULTS IN SINGAPORE

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1 Singapore Eye Research Institute, Singapore National Eye Centre; 2 Saw Swee Hock School of Public Health, National University of Singapore; 3 R&D Vision Sciences AMERA, Essilor International, Singapore; 4 Office of Research, Duke-NUS Medical School, Singapore; 5 Yong Loo Lin School of Medicine, National University of Singapore and National University Health System; 6 School of Optometry and Ophthalmology, Wenzhou Medical College, Wenzhou, China; 7 Department of Ophthalmology and Visual Science, Tokyo Medical and Dental University, Japan

Background: To determine the prevalence, risk factors, and impact of myopic macular degeneration (MMD) on visual impairment and functioning among adults in Singapore.

Methods: A comprehensive eye examination, including subjective refraction, axial length and visual acuity (VA) measurements were performed in adults aged ≥40 years in the Singapore Epidemiology of Eye Diseases (SEED) study. From fundus photographs, MMD was graded using the International META-PM classification. Vision-specific functioning (VSF) was assessed with a validated visual-functioning questionnaire (VF-11) using Rasch analysis.

Results: A total of 8,716 subjects were included in this analysis. The mean age (± SD) was 57.2 ± 9.5 years (33.5% Malays, 33.2% Indians and 33.3% Chinese). The prevalence of myopia (spherical equivalent [SE] ≤ -0.5 diopters [D]) and high myopia (SE ≤ -5.0 D) was 35.7% and 6.0%, respectively. The age-standardized prevalence of MMD was 3.8% (95% confidence interval [CI], 3.4-4.3%). The prevalence of MMD was 7.7% among low to moderate myopes, and 28.7% among high myopes. The prevalence of MMD increased non-linearly with SE and age. MMD was associated with older age, more myopic SE, and lower education. Subjects with Meta-PM categories 3 or 4 in the better-seeing eye had worse best-corrected VA (β, 0.19; 95% CI, 0.16-0.23) and poorer VSF (β, -9.7; 95% CI, -17.6--1.8) than those without MMD after multivariate adjustments.

Conclusion: Approximately one in 26 adults in Singapore has MMD. Older age and myopic SE are major risk factors of MMD. Severe MMD has a substantial impact on visual impairment and functioning.
Background: Patients with chronic open angle glaucoma (COAG) may be managed by medication (eye-drops) or by surgery. In cases unsuitable for medication or surgery, selective laser trabeculoplasty (SLT) may be done. A rapid health technology assessment was done to inform our hospital’s decision on offering SLT as a mainstream service. The PICO elements were:

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Conclusion: SLT is a mainstream treatment option for COAG. The decision on introducing SLT would depend on budget impact and sufficient workload to justify providing the service.
Poster Presentations

P28. MATERNAL DIETARY PATTERNS AND BIRTH OUTCOMES: A SYSTEMATIC REVIEW AND META-ANALYSIS

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Background: Findings on the relationships of maternal dietary patterns during pregnancy and risk of preterm birth and offspring birth size remain inconclusive. We aim to systematically review and quantify these associations among healthy pregnant women.

Methods: We searched 4 electronic databases up to December 2017. Three authors independently conducted literature search, study selection, data extraction, and quality assessment. Summary effect sizes were calculated with random effects models.

Results: We identified included 36 studies and pooled results from 25 observational studies (167,507 participants) were pooled. Two common dietary patterns - “healthy” and “unhealthy” were identified. Healthy dietary patterns - characterized by high intakes of vegetables, fruits, whole grains, low-fat dairy, and lean protein foods - were associated with lower risk of preterm birth [OR (95% CI) 0.79 (0.68, 0.91); I²=32%] for top versus bottom tertile and a weak trend towards a lower risk of small-for-gestational-age [OR (95% CI) 0.86 (0.73, 1.01); I²=34%]. Only data-driven healthy dietary patterns, but not index-based patterns, were associated with higher birth weight [β (95% CI) 67 g (37, 96); I²=75%]. Unhealthy dietary patterns - characterized by high intakes of refined grains, processed meat, and foods high in saturated fat or sugar - were associated with lower birth weight [β (95% CI) -40 g (-61, -20); I²=0%] and a trend towards a higher risk of preterm birth [OR (95% CI) 1.17 (0.99, 1.39); I²=76%].

Conclusion: Greater adherence to healthy dietary patterns during pregnancy is significantly related to lower risk of preterm birth. No consistent associations with birth weight and small-or large-for-gestational age were observed.
Background: The Student Health Advisor (SHA) Programme was initiated in 2010 to improve adolescent health in Singapore. Since its pilot, the programme scaled up from 8 secondary schools to 50 secondary schools, 3 Institutes of Technical Education (ITEs) and 5 Polytechnics. SHAs serve as a focal point for health promotion and lifestyle counselling, facilitate the timely detection and management of high-risk behaviours (e.g. obesity, smoking) and health-related issues among youths.

Methods: This presentation will showcase initiatives taken to encourage youths to modify their lifestyles through interventions, health-promoting environment, and the outcomes of SHA Programme. An IT system was developed to support the programme, automate data consolidation and to aid in the improvement of the programme.

Results: SHA Programme Preliminary Outcomes in 2017.
8028 overweight and severely overweight students participated in the Weight Management Programme. Among them, 6954 (86.6%) had completed the 3 sessions; of which 3138 (45.1%) managed to reduce BMI over the 6-month period. Youths surveyed had better dietary habits at the end of the programme. 3118 youth smokers were counselled by SHAs for smoking cessation. This engagement have yielded positive results with 1441 (46.2%) students reporting that they either quit or reduced smoking at the end of the 6 months’ intervention.

Conclusion: The SHA Programme increases youths’ awareness of health and provides direct access to health advice. SHAs’ presence in schools provides early intervention against at-risk behaviours and creates greater awareness towards importance of living a healthy lifestyle.
P30. HEALTHY EATING AND ACTIVE LIFESTYLE (HEAL) PROGRAM IN THE REPUBLIC OF SINGAPORE NAVY (RSN)

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Background: The RSN Healthy Eating and Active Lifestyle (HEAL) program was conceptualized and introduced by Navy Medical Service (NMS) in 2013 to improve the health of RSN servicemen. Coupled with the increased career lifespan of the Military Domain Experts Scheme (MDES), it was timely to introduce a holistic health and fitness program to the RSN.

Methods: The HEAL program comprises 2 major components, healthier diets and increase in physical activity. The programme also incorporates health promotion initiatives like smoking cessation workshops and mental wellness programs for our newly enlisted servicemen.

For healthier diets, a mixture of brown and white rice was introduced as the main dietary staple for all cookhouse meals in the RSN since Jul 2015. This initiative was very well received in the Navy such that it was subsequently rolled out in the rest of the SAF the following year. NMS is also working with the dieticians and cookhouse partners to review the RSN’s cookhouse caloric provisions as well as exploring innovative ways to increase the RSN’s dietary fibre intake.

In the area of promotion of physical activities, NMS introduced the ShipBoard eXercise (SBX) guide in Oct 2015, which enables servicemen to perform exercises safely within the confined shipboard environment as well as effectively with time constraints in between shifts.

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Conclusion: The current HEAL program initiatives have been well received by the RSN, and is expected to make significant health improvements to the RSN through its holistic framework. Way ahead, NMS will be developing targeted health promotion interventions to specific age groups and our National Servicemen (Reservist servicemen).
**P31. LEVERAGING PPP PARTNERSHIPS TO INFLUENCE AND SUSTAIN BEHAVIOURAL CHANGE IN HEALTH PROMOTION**

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*Health Promotion Board, Singapore*

**Background:** The Singapore Burden of Disease Study 2010 showed that approximately 50% of the burden of ill-health and death among Singaporeans were caused by non-communicable diseases (NCD) such as heart diseases, cancers, stroke and diabetes. This burden of disease increased from 2004, due to ageing population and inflow of residents. Fortunately, many of the NCDs have common lifestyle risk factors such as unhealthy diets, high sedentary levels and cigarette smoking which are outside the healthcare system.

**Methods:** To continue keeping Singaporeans healthy, especially in light of rapid ageing and rise in NCD, there was a need to shift from creating awareness to influencing the environments where people lived, played, worked and studied, to one that enabled individuals to make the healthier choices easily. The Health Promotion Board (HPB) embarked on a 5-year plan in 2015 to change health behaviours at the population level by leveraging Public-Private-People (PPP) Partnerships. PPP Partnerships sought to create demand for and supply of healthier options through programme and policy interventions in various areas such as food and physical activity, while ramping up efforts in public education and promotion to change the social norm for healthy living.

**Results:** HPB’s PPP Partnership efforts have boosted the prevalence of adults with sufficient physical activity to 80% in 2017 (National Population Health Survey, 2017). PPP initiatives have also increased the market share of healthier food products from 15% in 2012 to 23% in 2017 (AC Nielsen, 2017). HPB’s efforts have brought about changes in the private sector such as the reduction in the median sugar.

**Conclusion:** A multisectoral approach to change the environmental context can achieve sustained impact in influencing health behaviours at the population level. PPP partnerships also provide a sustainable way to achieving better health for all.
P32. INVESTIGATING YOUTHS’ CURRENT PHYSICAL ACTIVITY LEVELS, PERCEPTIONS TOWARDS EXERCISE, AND RESPONSES TOWARDS INCENTIVES

Nicholas Ho Ching Wei, Goh Rui Ying, Kong Xiangchen, Lexus Lee Zong Han, Adeline Seow, Liow Chee Hsiang
College of Alice and Peter Tan, National University of Singapore, Singapore

**Background:** Population-wide programmes in Singapore that aim to increase physical activity have recently included the use of incentives (e.g. vouchers, discounts, gifts) linked to achieving activity targets. While these programmes have shown some overall success in recruiting participants, there has been difficulty in convincing youths to sign up. This study thus sought to determine the current level of physical activity among youths, understand their perception of exercise, and their response to incentives.

**Methods:** An electronic questionnaire survey was administered to a non-probability sample of 102 undergraduates from the National University of Singapore.

**Results:** It was found that around half (52.0%) of the respondents met the recommended level of physical activity (66.7% of males and 41.9% of females). Interestingly, there was a significant increasing linear trend between socioeconomic status (SES) and the proportion of respondents who met the recommended physical activity levels. When asked to rate which factors best motivate them to exercise more than they currently do, peer support, and having more free time appealed to the respondents significantly more than incentives did. The degree to which incentives were perceived to increase one’s level of physical activity did not differ between those who did and did not meet recommended physical activity levels, males and females, those who stay and do not stay on campus, and among those of different SES.

**Conclusion:** Future programmes targeting youths can therefore focus on garnering peer support and improving time management, independent of, or in addition to incentives.
P33. INTEGRATED-CARE CLINICS IMPROVE PATIENT MANAGEMENT
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Singapore General Hospital

**Background:** Care fragmentation is associated with lower care quality and greater resource consumption, thereby raising healthcare costs. It is complicated by increasingly specialised providers, growing multimorbidity disease burden and case-complexity, and systemic issues of poor coordination and information sharing. Integrated-care clinics are potential solutions. We discuss our experience implementing such clinics for patients with suspected work-related complaints.

**Methods:** The monthly Multidisciplinary Joint Occupational Medicine clinic was established in a large tertiary hospital for complex cases with clinically-related socio-occupational issues. A multidisciplinary review board model was used, comprising in-house specialist physicians, and employer/regulatory authority representatives as relevant. Each case was managed together with employer and patient, through a holistic approach including occupational/workplace assessments.

We reviewed all cases from September 2013 to February 2017 for: symptom duration, diagnosis, work-relatedness, management and follow up.

**Results:** Of the 81 cases, most had symptoms >5 months (Interquartile-range 3-10) prior to clinic review. Majority were dermatological (n=35, 43.2%) or musculoskeletal disorders (n=25, 30.9%), with two-thirds being work-related (n=40, 67%). Most were concluded regarding social/work-relation at the first visit (n=47, 58%). The rest (n=34, 42%) required average 2.56 visits (IQR 2 - 3, max 5).

Qualitatively, our clinic model was more efficient, while remaining patient-centric. The real-time discussion format between stakeholders and care-providers reduced miscommunication and enhanced information-sharing. Direct patient involvement allowed for effective management of clinical and socio-occupational issues simultaneously within a single session.

**Conclusion:** Our clinic model reduces care fragmentation and improves patient management, while potentially reducing cost. Given increasing case-complexity with the growing multimorbidity burden, benefits are likely significant.
**P34. COMMUNITY MULTIDIMENSIONAL FRAILTY SCREENING – A FEASIBILITY PILOT IN SINGAPORE’S PUBLIC HEALTH SYSTEM**

Katherine Butler  
*Healthy Ageing Programmes, Preventive Health Programmes Division, Health Promotion Board, Singapore*

**Background:** The Tilburg Frailty Indicator (TFI) and FRAIL are short, validated measurements. TFI is a multidimensional tool while FRAIL addresses physical risk and includes pre-frail scoring. The two measurements were integrated into one screening tool. Adults ≥60 years were recruited during two 2018 community screenings. The second took place in a socioeconomically disadvantaged community. Trained volunteers administered the questionnaire. Participants identified as pre-frail or frail were referred to community services for further assessment.

**Methods:** The Tilburg Frailty Indicator (TFI) and FRAIL are short, validated measurements. TFI is a multidimensional tool while FRAIL addresses physical risk and includes pre-frail scoring. The two measurements were integrated into one screening tool. Adults ≥60 years were recruited during two 2018 community screenings. The second took place in a socioeconomically disadvantaged community. Trained volunteers administered the questionnaire. Participants identified as pre-frail or frail were referred to community services for further assessment.

**Results:** 170 seniors (M 67.4 [range 55-93], 76% female, 86% Chinese) completed the questionnaire. Fifteen (8.8%) were classified as frail using either TFI or FRAIL and seventeen (10%) pre-frail using FRAIL. Three reached the frail threshold for both tools. Six were classified as pre-frail with FRAIL but frail using TFI suggesting significant psychosocial risk. The majority of frail participants were female (73%) and from the socioeconomically disadvantaged site (60%). All those detected as pre-frail or frail agreed to follow up.

**Conclusion:** Results demonstrate the feasibility of multidimensional frailty screening. Moreover, psychosocial frailty may disproportionally affect at-risk populations. Referral pathways established support an integrated approach to managing frailty. Further research is required to understand how public health initiatives can best address multidimensional frailty needs in diverse communities.
**Poster Presentations**

**P35. DEVELOPING A RISK STRATIFICATION MODEL FOR FREQUENT ADMITTER IN A MULTI-ETHNIC SOUTH EAST ASIAN COMMUNITY**

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¹.Health Services Research, Changi General Hospital; ².Integrated Health Information Systems

**Background:** To develop a model to identify patients at higher risk of frequent hospital readmissions in Changi General Hospital (CGH).

**Methods:** This is a retrospective cohort study of patients admitted to CGH in 2011 with a 12 month follow-up period. Previous health care utilization data preceding index admission in 2011 will be derived using retrospective administrative data in 2010. Inpatient frequent admitters were patients with three or more unplanned hospital admissions in the follow-up period. Hospital administrative databases provided information on demographic characteristics, clinical profiles, and previous hospital utilization status. Logistic regression model was applied to determine independent risk factors. The three risk levels (low, medium, high) were used to establish a risk scoring by probability correspondingly using a regression model. All analyses were conducted using R version 3.2.3.

**Results:** We analysed 21530 patients in this study. The patients were randomly divided into two groups; 80% as the derivation cohort and 20% were used as the validation cohort. The 11 significant predictors of frequent admitters were age, gender, race, utilisation of medical social service, specialized outpatient clinic utilization in previous 1 year, Accident and Emergency attendances without inpatient admission in previous 1 year, admissions in previous 1 year, choice class, admit type, admit department, and referral source. The model performances were AUC 0.81, sensitivity 0.35, specificity 0.94, negative predictive value 0.85, and positive predictive value 0.60 respectively.

**Conclusion:** By using high level hospital administrative data, we have developed the frequent admission automated prediction model with good discriminatory ability.
P36. DO SOCIAL NETWORKS AND ACCESS TO COMMUNITY CARE INCREASE CHRONIC CARE SELF-MANAGEMENT AMONG LOW-INCOME OLDER ADULTS IN SINGAPORE?

Lee, M. J & Chan, A
Duke-NUS Medical School, Singapore

Background: There has been increasing recognition that community and social approaches improve chronic illness self-management. In this study, we examine the associations between types of social network and community-based services on chronic illness self-management among older adults living in public rental flats.

Methods: 577 participants from a 2016 survey conducted among community dwelling older adults (≥60 years and above) living in public rental flats in one Housing and Development Board Estate in central region of Singapore contributed to the analyses. Self-management was measured using Partners in Health scale. Multiple regression models were used to assess the association of types of social networks and community-based services on chronic illness self-management.

Results: Friendships and visits by volunteers for social interactions in the past 6 months were associated with better chronic illness self-management after controlling for sociodemographic and health variables. No association was observed for family social networks, day care centers (e.g. Senior Activity Centres), home-health services (e.g. visits by doctors and nurses) and home-help services (e.g. cleaning and delivering meals).

Conclusion: In this cross-sectional analyses of low income older adults, friendships and visits by volunteers for social interactions play an important role in the management of chronic illness. Future studies may explore the features of these factors in the design of programme to empower low income older adults in chronic disease self-management.
P37. EXPLORATION OF FACTORS INFLUENCING CHOICE OF HEALTH CARE PROVIDER FOR NON-EMERGENCY CONDITIONS

Singapore University of Technology and Design, Changi General Hospital, Singapore

Background: This study seeks to explore factors influencing the choice of seeing a General Practitioner (GP) over the Emergency Department (ED) for non-urgent conditions to reduce self-referrals to the ED.

Methods: This is a cross-sectional self-administered preference survey. Participants were recruited from a tertiary hospital from August 2016 to July 2017, and comprised of 238 who were self-referred (n=106) to the ED or GP (n=132) in the preceding 3 months. The survey captured participants’ choice of GP or ED for four different non-urgent scenarios; each scenario had 22 choice sets which examined change effects in the following within each choice set compared to base case: availability of onsite services, locum doctors, travel time, cost of care, out-of-pocket payment, and subsidy at ED with a GP referral. McNemar’s test was used to derive the odds ratio of choosing GP over ED for each variable. Other information captured included sociodemographic, self-rated criticality of one’s condition and individual scenarios.

Results: Perception of one’s condition as critical, and during office hours, ED financial subsidy, and GP insurance coverage, increased the odds of choosing GP. After office hours, locum GP and higher GP fees reduces the odds of choosing GP. However, financial subsidies at ED increase the odds of choosing GP despite management by locum GP. GP Services did not increase the odds of choosing GP.

Conclusion: The perceived criticality of one’s condition increases the choice of ED. Strategies to subsidize ED charges after being seen by a GP and GP insurance coverage could increase the choice of GP.
P38. IMPORTANCE OF VALIDATION STUDIES IN THE DESIGN AND CONDUCT OF POPULATION HEALTH STUDIES


Lee Kong Chian School of Medicine, Nanyang Technological University, Singapore

Background: The Health for Life in Singapore (HELIOS) Study aims to collect biological data from 10,000 adults. Saliva, blood, skin microbiome, urine and stool samples will be stored for a wide range of future research. It is thus imperative to ensure that the stored samples and planned clinical chemistry analysers are fit for the intended purpose, and generate high quality data as part of the preparatory work.

Methods: We collected blood and separated serum from 20 participants and analysed “fresh” (without freezing), or “frozen” samples after short-term storage at -80°C. We measured 22 analytes using a clinical chemistry analyser dedicated to the HELIOS study (“Internal Analyser”) and calculated coefficients of variation (CV). We compared CV and total error (TE) of electrolytes, measured by the Internal Analyser and a well-validated reference analyser from an accredited external service provider (“External Analyser”).

Results: Within-assay CV was acceptable in fresh samples (range 0.2-3.6%), but unacceptably high in frozen samples (0.4-11.4%) on the Internal Analyser. In contrast, results were highly reproducible when assayed on the External Analyser, including on frozen samples (0.3-1.1%), indicating a specific failing of the Internal Analyser on frozen samples. Preventative maintenance did not resolve the problem. Comparing the 2 analysers, TE for chloride (4.54%) and sodium (1.07%) exceeded acceptable values (chloride-1.50% and sodium-0.73%), which further confirms unacceptable performance of the Internal Analyser.

Conclusion: The Internal Analyser failed to meet acceptable precision performance criteria, and thus will not be used in the HELIOS Study. Our findings emphasise the importance of careful validation of analyser performance in large-scale population studies.
Background: Appropriate patient selection for outpatient parenteral antibiotic therapy (OPAT) is necessary to reduce potential complications and early termination.

Methods: From 2014 to 2017, we conducted a prospective cohort study of all patients referred to SGH’s OPAT service. We evaluated the following: complications on OPAT; early termination requiring readmission during OPAT; all-cause readmission 30 days after OPAT completion; preference for OPAT (vs. inpatient therapy) and return to work while on OPAT. We used chi-square for univariate analysis and cox regression for multivariate analysis.

Results: From 2014 to Oct 2017, a total of 1213 patients received OPAT at our centre. Of those, 13.2% (160/1213) developed complications. About 10% (132/1213) of patients were readmitted while on OPAT and OPAT was terminated early. Amongst patients who completed OPAT (N=1081), about 3.6% (39/1081) were readmitted within 30 days. The majority who completed OPAT (87.0%, 941/1081) preferred OPAT, and about half (50.8%, 278/547) returned to work while on OPAT. On multivariate analysis, patients who had cancer, on vancomycin, or >1 month of OPAT were more likely to experience complications, while those with perfect health-related quality-of-life (HRQoL) and pyelonephritis were less likely to experience complications (p<0.05). Being male, having mood/anxiety problems, intrabdominal abscesses, using vancomycin, and on OPAT >1 month was associated with higher risk of early termination; while employment and perfect HRQoL was associated with lower risk (p<0.05). Individuals with pain were more likely to readmit. Those employed were more likely to prefer OPAT; and those having perfect HRQoL were more likely to prefer OPAT and return to work.

Conclusion: OPAT was preferred over inpatient therapy, with working individuals preferring OPAT. Baseline HRQoL was significantly associated with lower complications and early termination, as well as higher preference for OPAT and return to work.
Background: We sought to examine sociodemographic factors associated with hospital admissions and A&E attendances amongst public rental flat residents.

Methods: We surveyed all residents aged ≥60 years in a public rental housing precinct in central Singapore in 2016. Residents self-reported their number of A&E attendances, as well as hospitalisations, in the past 6 months. We obtained information on residents’ sociodemographic characteristics, medical, functional and social status via standardised questionnaires. We used chi-square to identify associations between A&E attendances/hospitalisations and sociodemographic characteristics, on univariate analysis; and logistic regression for multivariate analysis. As a comparison group, we used data from a nationally representative population-based cohort study of elderly Singaporeans (Duke-NUS PHASE Study) recruited in 2015.

Results: Our response rate for the rental flat population was 70.1% (928/1324). In the rental flat population, around 9% (83/928) of residents had attended the A&E in the last 6 months; while 10.5% (100/928) had been admitted to hospital. In the PHASE cohort, 10.5% (158/1497) had attended the A&E in the last 6 months, while 12.4% (187/1497) had been admitted to hospital. In the rental flat population, having a religion was independently associated with lower odds of A&E attendance and hospitalisation, whereas poorer coping and better adherence was associated with higher odds of A&E attendance and hospitalisation. Rental flat residents on regular medical follow-up had lower odds of A&E attendance. Conversely, in the PHASE cohort, having a religion was not independently associated with A&E attendance/hospitalisation on multivariate analysis, and regular medical follow-up was associated with higher odds of A&E attendance and hospitalisation.

Conclusion: In this public rental flat population, religion, coping and adherence were independently associated with A&E attendances and hospitalisation. Rental flat residents on regular follow-up had lower odds of attending the A&E; in the general population, residents on regular medical follow-up had higher odds of A&E attendance and hospitalisation.
P41. NEIGHBOURHOOD ENVIRONMENT, HEALTH AND SOCIOECONOMIC STATUS – HEALTH NEEDS AMONGST LOW INCOME PUBLIC RENTAL FLAT RESIDENTS IN SINGAPORE

Oen K, Yee J, Lee S, Wee LE, Koh G

Yong Loo Lin School of Medicine, National University of Singapore; Department of Internal Medicine, Singapore General Hospital; Saw Swee Hock School of Public Health, National University of Singapore, National University Health System

Background: As rental and owner-occupied flats are integrated, we investigated differences in perception of the neighbourhood environment and their association with health-seeking behaviours amongst Singapore residents.

Methods: We surveyed residents ≥40-years-old in 2 public housing precincts in 2016 using a 16-item Neighbourhood Environment Score, covering personal safety, physical convenience and social cohesion. Responses were assigned 1=true/o=false. We defined “less-” and “more-” “disadvantaged neighbourhood” as scores of >8 and ≤8 respectively. For subscore items, scores of 0 and >0 were defined as “lower-“ and “higher-” “perceived safety/perceived convenience” respectively. Sociodemographic information was obtained via questionnaires. We used chi-square to identify associations between perceptions of neighbourhood disadvantage and sociodemographics and health-seeking behaviours, on univariate analysis; and logistic regression for multivariate analysis.

Results: Of 528 participants (response rate=62.1%), 37 stayed in studio apartments integrated into owner-occupied blocks, 238 in rental flat blocks, and 253 in owner-occupied blocks. Amongst these groups, 40.5%, 37.8% and 24.5% perceived their neighbourhood as more disadvantaged respectively. Social isolation and being non-religious were associated with lower perceived neighbourhood safety and convenience (p<0.05). Staying in a rental/studio apartment was independently associated with perceived neighbourhood disadvantage (aOR=1.58;95%CI=1.06-2.35;p=0.024). While perceived neighbourhood disadvantage was not associated with healthcare utilisation (regular follow-up;hospitalisation;A&E attendances), those with this perception were less likely to participate in diabetes screening (aOR=0.63;95%CI=0.41-0.95;p=0.027) and exercise regularly (aOR=0.67; 95%CI=0.45-0.98; p=0.045).

Conclusion: Although needy and more well-to-do residents share the same environment, differences in perception of the neighbourhood environment exist, possibly due to social isolation. Perceived neighbourhood disadvantage is associated with lower uptake of preventive services and exercise participation.
P42. MONITORING DAILY ACTIVITIES OF OLDER ADULTS IN SINGAPORE BY USING HOME-BASED SMART SENSORS
Shan-Qi LEE
Nanyang Technological University, Singapore

Background: Home-based smart sensors (HSS) have been widely used in homecare for older adults, and can facilitate them to age at home confidently and securely. However, the implementation of HSS was not well-documented by previous studies. This study aims to explore older adults’ daily activities to get better understanding of behavioral patterns of them.

Methods: HSS were deployed for one month (Apr-May 2018) in 10 older adults’ homes, who stayed alone and 80% of whom were aged 65 and above. 80% of them are female. The same set of HSS were installed, including three motion sensors, one power sensor, one door contact, and one key tag. Interviews and surveys were conducted with them after the one-month implementation.

Results: The most recent 24-hours movement was analyzed by aggregating data to five-minute time windows. To obtain personalized analytics and real-time predictions, calculations need to base on time windows which are unique to each older adult. Graphs indicated that most movements occurred between 8 am to 12 pm for most elderly. Some had more movements during night in bathroom. Certain older adults showed events of heavy coughing for consecutive days.

Conclusion: Findings demonstrated that continuous monitoring of older adults can detect unusual behaviors of theirs. Furthermore, it also can capture patterns of older adults’ daily activities, which may show some functional decline. It was manifested that HSS can improve the sense of security of older adults from the interviews and surveys. Despite privacy and finance concerns, older adults were satisfied with HSS assisting to achieve optimized homecare.
**P43. SEEING A DOCTOR IN A PHARMACY: A CASE SERIES OF TELEMEDICINE EXPERIENCE IN TWO PHARMACIES AND A GUIDE TO KEEP TELEMEDICINE SAFE AND EFFICIENT**

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IDOC Clinic Pte Ltd, Unity Tampines One and Unity Thomson Plaza Pharmacies

**Background:** Telemedicine remains a largely under-utilised form of connecting patients with doctors and is relatively new in Singapore. We would like to share our experiences with running telemedicine in a pharmacy setting, where prescription-drug selection is wider, increasing efficiency and revolutionising the delivery of medical care.

**Methods:** We have built telemedical stations in various Unity pharmacies where doctors and patients can communicate using such stations in the form of a video chat through an encrypted network channel using our self-written software. The cubicle is enclosed with sliding doors, providing a sense of privacy. We have trained the local pharmacist to be able to use the system independently. Patients are recruited when deemed to have an actual need to use the system by the pharmacist or trained staff.

**Results:** We will present 6 cases, in which we have deemed telemedicine to be safe. This case series will showcase patients using telemedicine, the quality of care, the feedback and learning points from our experiences. In our presentation, we also discuss how we evolved different methods of keeping telemedicine safe and efficient. We also highlight conditions not suitable for telemedicine and pitfalls for doctors who wish to leverage on video communication with their patients.

**Conclusion:** In cases where physical examination is not required, telemedicine has shown its potential to be safe and efficient when placed in pharmacies, saving the need for double trips. The potential of treating a patient through visual examination alone remains unexplored but promising.
P44. THE CUEPBOX AS AN ENABLING TOOL IN IMPROVING MEDICATION ADHERENCE
Shan-Qi LEE
Nanyang Technological University, Singapore

Background: Medication adherence is one of the fundamental aspects of elder care and constitutes a critical process in achieving desired health outcomes. As the elderly is a patient group that is especially susceptible to medication non-adherence, careful measures need to be taken to improve adherence behaviours among them.

Methods: We have designed an automated pill dispenser and reminder called the CuePBox that can be customized to prompt elderly patients to take their medication on time. Eight elderly patients from two senior activity centres (SACs) in Singapore were selected to use the CuePBox for a continuous period of one month. Throughout the one-month study, the patients’ daily medication-taking patterns and adherence rates were monitored remotely via a web interface by the administrator at the respective SACs. At the end of the study, in-depth interviews were conducted with the elderly patients to determine the effects of the CuePBox on their adherence behavior and health outcomes.

Results: We noted an overall adherence rate of at least 72% among the elderly patients, with a maximum result of 98% in two elderly patients. It was found that lower adherence rates happened when an elderly was away from home and thus missed the medication time. Most elderly patients observed improved health outcomes in the form of lower blood pressure and blood glucose readings throughout the one-month study.

Conclusion: The CuePBox is an effective enabling tool in helping to improve the medication adherence behavior and health outcomes of elderly patients.
**P45. THE HEALTH FOR LIFE IN SINGAPORE STUDY (HELIOS) STUDY: PRECISION MEDICINE FOR SINGAPOREANS**

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**Background:** The Singapore population is rapidly aging and facing an increasing disease burden including diabetes, cancer and cardiovascular diseases. The HELIOS Study aims to collect comprehensive health information from 10,000 people to understand the aetiopathogenesis of chronic diseases in Singapore, and discover novel strategies to predict and prevent diseases using a precision medicine approach. Here we describe results of pilot study carried out to validate the study protocols.

**Methods:** We evaluated 184 healthy Singaporeans aged 30-84 years and 1) administered comprehensive health and lifestyle questionnaires; 2) performed the following measurements: anthropometry, ECG, spirometry, blood pressure, dermatological exam, grip strength, and treadmill tests; 3) collected blood, saliva, urine, and skin (for microbiome). To assess quality of the data and samples, we quantified inter- and intra-observer variability and looked for presence of expected associations between clinical variables.

**Results:** The Intra-Class Coefficients of clinical measurements were all ≥0.80. Expected associations were found across the clinical measurements and questionnaire items; male participants had higher BP than females (p<0.0001), and participants’ scores of PHQ-9, GAD-7 and global PSQI (depressive, anxiety symptoms and sleep problem, respectively) were all significantly cross-associated (r>0.34, p<0.0001) independent of age and sex. Participants who self-reported high BP (n=38/182) and dyslipidaemia (n=62/177) had higher SBP/DBP (Deltamean [SD]=20.83[2.87]/ 9.60[1.83] mmHg, p<0.0001) and higher total cholesterol/HDL ratio (Deltamean [SD] =0.55[0.17], p=0.001), respectively.

**Conclusion:** The HELIOS pilot study confirms collection of high-quality research data and samples in support of the Study’s aims to inform precision medicine.
P46. THE IMPLICATION OF FEAR OF CRIME ON LONELINESS AND PERSONAL MASTERY IN OLDER ADULTS ATTENDING SENIOR ACTIVITY CENTRES IN SINGAPORE

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Background: Studies have reported an inverse relationship between fear of crime and mental and physical health. In this study, we examine the association between fear of crime and two types of subject wellbeing measurements, namely loneliness and personal mastery. Furthermore, we investigate if gender and ethnicity moderate the association.

Methods: 1271 participants from a randomized Senior Activity Centre Survey contributed to the analyses. Fear of crime was assessed using a modified version from Jackson (2004). Loneliness and personal mastery were assessed using University of California, Los Angeles’ (UCLA) 3-item scale and Pearlin Mastery Scale respectively. Multi-level regression models with inverse probability of treatment weights were used to assess the association of fear of crime on loneliness and personal mastery and the moderating effects of gender and ethnicity.

Results: Fear of crime was associated with both loneliness and personal mastery. An increase in a unit in fear of crime was associated with a 0.085 unit (95% confidence interval [CI]=0.028, 0.143) increase in loneliness and 0.195 unit (95% CI=-0.313, -0.077) reduction in personal mastery. Interaction analyses showed that the effect between fear of crime and loneliness was stronger in men than women. The negative association between fear of crime and personal mastery was found only among the Chinese.

Conclusion: Fear of crime results in lower subjective well-being among older adults. Programs that reduce fear of crime may contribute to better health among older adults.
P47. THE USE OF MODELLING AND SIMULATION TO GUIDE PUBLIC HEALTH POLICY

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Background: Evidence-based policy has been the cornerstone of public health policy development with randomized controlled trials perceived the `gold standard’. However, the `real world’ presents practical barriers that restrict experimental approaches for evidence generation. It is impossible to examine the counterfactual and hence dynamic modelling and simulation are tools increasing used to allow for experimentation in a virtual environment. We present 2 examples of our modelling work which can help inform decision making in health policy.

Methods:
1. Assess economic feasibility of adopting a habilitative model vs the current medicalized model in Singapore nursing homes - We examined the cost structure, benchmarked them against international models and applied simulation modelling to generate different combinations of existing and potential cost variables i.e. new care models, different space layouts and nursing staffing models etc.

2. Assess the impact of recently introduced smoking intervention policies on smoking prevalence and disease mortality - We used population health impact model based on closed cohort approach and first-order Markov chain design

Results:
1. Our modelling identified that transitioning to a habilitative model could be done at low cost (~$8/patient/day in the base case) with specific combinations of space planning, care models and staffing models adapted to the Singapore context. The model suggests that Singapore could explore such habilitative models with manageable financial impact

2. Our model estimated the new policies cumulatively would reduce smoking prevalence by 1.5% and reduce ~1,900 smoking-related deaths over a 30-year period. These modest effects merit examination of more robust measures to complement these policies.

Conclusion: Modelling and simulation-based insight into population health scenarios can improve decision-making in policy development, planning, and implementation by providing decision-makers with a deeper understanding of the effectiveness of the options they have.
P48. LONELINESS AMONGST PUBLIC RENTAL FLAT RESIDENTS IN SINGAPORE
Jaime Yee, Kelynn Oen, Shannon Lee, Liang En Wee, Gerald Koh
Yong Loo Lin School of Medicine, National University of Singapore

Background: The objective of the study aims to explore if differences in loneliness exist in Singapore public housing estates, given that public rental flats share the same built environment as their neighbouring residents in owner-occupied housing, though the social environment may differ.

Methods: We surveyed all residents aged ≥40 years in two public housing precincts in Singapore in Sept 2016. Comorbidity burden was measured using the Charlson’s Comorbidity Index (CCMI). Functional status in basic activities of daily living (bADL) was also quantified using the Katz Index, while social isolation was quantified using the Lubben’s Social Network Score-6 (LSNS 6). Loneliness was quantified using the 3-item UCLA Loneliness Scale. HRQoL was quantified using the EQ5D. Subjective measures of the neighbourhood environment aim to assess perceived personal safety, physical convenience and social cohesion within the neighbourhood. We surveyed residents’ perceptions of the neighbourhood environment by using a modified version of the Neighbourhood Environment Walkability Scale-Abbreviated (NEWS-A).

Results: A total of 528 residents participated in our study. The response rate was 62.1%. Overall, staying in a stand-alone block, staying in a rental flat, staying in 3-room apartments or smaller, staying in a neighbourhood with greater perceived disadvantage, lower safety and convenience, and a poorer living environment were all factors associated with loneliness, as were being single, not having a religion, being unemployed, having a lower household income, more medical comorbidities, having anxiety/mood issues, poorer functional status, having lower health-related quality of life, and being socially isolated (p<0.05). Staying in a rental flat apartment was independently associated with loneliness (adjusted odds ratio, aOR=2.10, 95%CI=1.32-3.36), as was staying in a poorer living environment (aOR=1.92, 95%CI=1.15-3.22). Loneliness was not significantly associated with regular cardiovascular and cancer screening participation, lifestyle behaviours such as exercise, smoking or drinking. However, it was associated with hospitalization in the past 6 months (OR=1.99, 95%CI=1.20-3.32), together with comorbidities, employment and HRQoL.

Conclusion: Although needy Singapore residents share the same built environment as more well-to-do neighbours, differences in loneliness do exist. These differences may be driven by differing perceptions of the physical environment and social environment that reinforce insecurity and stigma, and contribute to social isolation. Loneliness was independently associated with hospitalisation within the rental flat population. There is a need for social services that can reintegrate of lonely elderly individuals into the community.
P49. DETECTION OF SALMONELLA ENTERICA IN RETAIL CHICKEN EGGS FROM A SELECTED PUBLIC MARKET IN THE CITY OF MANILA

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Background: Poultry products, specifically eggs, are commonly implicated food vehicles in transmitting human Salmonellosis. Salmonella enterica serotypes are one of the most common causative agents of Salmonellosis worldwide. However, there is scarcity of available information on the presence of Salmonella in eggs in the Philippines. The primary objective of this study is to determine the presence of S. enterica serotypes from different parts of the chicken egg sold in a selected public market in the City of Manila.

Methods: Seventy-two egg samples were obtained from the selected public market, and were examined for Salmonella, following the method set by the Bacteriological Analytical Manual (BAM).

Results: A total of 184 colonies were isolated, 40 (22%) of which were undetermined since they failed to satisfy any of the discard criteria and meet any of the biochemical profile of identifiable Salmonella enterica serovars. Among these isolates, 1% were identified to be Shigella spp., while another 1% were found to be Providencia spp. The rest (20%) were classified as potential Salmonella isolates. These potential isolates were obtained from 29 out of the 72 eggs, which means that 40% of the eggs are possibly contaminated with Salmonella. Out of these 29 eggs, 19 (66%) had isolates coming from the egg shells, while 7 (24%) had colonies from the egg content. The remaining 3 (10%) eggs had isolates from both the egg content and the shell. Furthermore, 21 (87%) out of the 24 stalls had at least one of their eggs possibly contaminated with Salmonella.

Conclusion: Further testing such as serotyping is needed to guarantee the presence of S. enterica in the examined chicken eggs, which may provide more definite implications on the sanitary conditions in the market, poultry farms, or in food handling.
P50. MEDICATION ADHERENCE AMONG DIAGNOSED HYPERTENSIVE PATIENTS AGED 25-59 YEARS OLD IN A SELECTED BARANGAY IN MANILA

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University of the Philippines Manila; Philippines

Background: Medication nonadherence is one of the major causes of treatment failure especially in chronic diseases such as hypertension. Previous studies in other countries have determined certain factors associated with medication adherence but little is known about this subject matter in the local setting.

Methods: A cross-sectional study design was employed. The study population consisted of hypertensive patients registered under J. Vicencio Health Center located in Barangay 898, Santa Ana. Non-probability sampling method was employed to recruit study participants. A house-to-house structured interview was administered utilizing the following data collection instruments: Medication Adherence Questionnaire (MAQ), Brief Illness Perception Questionnaire (BIPQ), Patient-Doctor Relationship Questionnaire (PDRQ-9), and Short-Form Health Literacy Questionnaire (HL-SF12). Medication adherence behavior was assessed using MAQ. A total score of 0-1 was defined as adherent while 2 or above was considered as nonadherent.

Results: A total of 47 hypertensives participated in the study, 51.06% of whom were nonadherent. Comorbidity (PR:1.15, 95% CI: 0.66-2.01), illness perception (PR:1.61, 95% CI: 0.50-5.17), patient-doctor relationship (PR:1.6, 95% CI: 0.96-2.75), and health literacy (PR:1.96, 95% CI: 0.90-4.27) were associated with medication adherence behavior, however, the associations were not statistically significant.

Conclusion: Majority (51.06%) of the hypertensives were nonadherent to antihypertensive medication. Associations were found between each selected patient-related factor and medication adherence behavior; however, these were not statistically significant.
P51. GLOBAL MENTAL/BEHAVIORAL OUTCOME: WHAT follows AFTER GLOBAL NUTRITION TRANSITION

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**Background:** Mental health disorder is a global health disease that threatens to overwhelm developing countries. The spectrum of this disorder can range from psychosis, dementia, intellectual & learning disorder, and substance abuse. It has a broad set of conditions that can affect areas of behavior, cognition, and emotional well-being of an individual. Although the determinants of these disorders are multi-factorial, however, the rise of non-communicable diseases (NCD) following the global nutrition transition is an important step in the development of global mental health disorders. We aim to present a new framework into the evolutionary process of global health diseases by considering how “global nutrition transition” with its evolutionary implications can fundamentally lead to a “global mental health transition”. This study proposes a dynamic framework to advance the level of understanding by looking at the role of non-communicable diseases (NCD) as an ‘intermediate, transition processes into the evolutionary development of global mental & behavioral transition as a definitive worldwide public health outcome.

**Methods:** Archival research and case study analysis was performed based on the scientific articles and conference proceedings published between 1995 and 2017 with keywords related to global nutrition, mental health disorders and developmental origins of health and diseases. Both animal based and public health research data were used in this study.

**Results:** The global mental (behavioral) health disorders are a dynamic group of disorders ranging from learning & behavioral disorders in children, substance abuse, mood/psychiatric disorders, and dementia in the elderly. These disorders surpass the incidence of non-communicable diseases worldwide. The cumulative data from recent studies indicate that current changes in the dietary habits worldwide have created a global epidemic of non-communicable diseases (NCD). In most of the developing countries the problem of mental related diseases has continued to increase that threatens to overwhelm their limited capacities and resources. In order to address these catastrophic dilemmas the need to create and develop a new framework is needed.

Framework: (Global Nutrition transition -> Emergence of Non-Communicable Diseases -> Global Mental/Behavioral Outcome).

**Conclusion:** The result indicates that mental health disorder (learning & behavioral disorders, psycho-social addiction, mood disorders, dementia, etc.) is a worldwide public health phenomena. This phenomena calls for the development of a new framework that serves to elucidate the interrelationship starting from the global nutrition transition to the emergence of non-communicable diseases (NCD) that serves as an intermediary phase, and finally leading to global mental/behavioral outcomes. The training and development of allied health specialists that understands the evolving patterns of diseases is an important step in bridging the knowledge gap from NCD to mental disorders. In addition this framework can serve as a resource mechanism that can lead to an improved and better health care promotions and management.
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