Ab31
Assessing self-care behaviour of heart failure patients: a cross-cultural adaptation of two heart failure self-care instruments

DSF Yu[1], DTF Lee[1], DR. Thompson[2], J Woo[3], EMF Leung[4]
[1]The Nethersole School of Nursing, CUHK
[2]Department of Health Sciences, University of Leicester, UK
[3]School of Public Health and Primary Care, CUHK
[4]Department of Medicine & Geriatrics, UCH

Background: Successful management of heart failure relies on effective self-care. Reliable and valid measures for heart failure self-care are essential for identification of patients' self-care needs and evaluation of health services.

Aims: To perform cross-cultural adaptation and psychometic evaluation of the Self-Care Heart Failure Index (SCHFI) and the European Heart Failure Self-care Behavioral Scale (EHFScBS) for use in the Chinese population. A purposive sample of 19 heart failure patients were recruited from a subacute hospital and a community-based programme for focus group interviews. Their views and that of an expert panel were used to conduct cross-cultural adaptation of the tested instrument. Another 143 heart failure patients were recruited from the out-patient clinic for conducting the psychometric evaluation. The main outcome measures involve the Chinese versions of SCHFI and EHFScBS. The Medical Outcomes Study Social Support Survey (MOS-SSS-C) and the Hospital Anxiety and Depression Scale (HADS) were used to for construct validation.

Results: A few SCHFI and EHFScBS items were modified to enhance their cultural relevancy. The Chinese versions of SCHFI and EHFScBS had content validity indices as 0.89 and 0.93, and Cronbach's alphas as 0.82 and 0.73, respectively. Construct validity were only supported by their respective significant moderate correlation with MOS-SSS but not by their relationships with HADS. The low level of psychological distress among the sample may mask such theoretically purported relationship. The proposed 3-factor structure of the SCHFI was supported, but the contribution of two items to the overall construct and sub-constructs need reconsideration.

Conclusions and implication: The Chinese version of SCHFI and EHFScBS are culturally relevant, reliable and valid instruments for assessing self-care of heart failure patients. The SCHFI can be used to understand the self-care needs of heart failure patients whereas the EHFScBS can be used to evaluate heart failure related patient empowerment programmes.

Ab53
Survey of tobacco and alcohol consumption among secondary students in Hong Kong

JH Chen, J Chung
Department of Health and Physical Education, HKIE

Aims: This project aimed to evaluate the alcohol and tobacco use among Hong Kong secondary students so that the relevant health promotion programme can be initiated to promote a healthier lifestyle among secondary students in the future.

Methods: The General Health School Survey Questionnaires adapted by World Health Organization is used in this study. Five secondary schools in Tai Po were invited to participate in this study in March 2010.

Results: 3,570 (male 1,754 and female 1,816) students from secondary 1 to secondary 4 participated in the project and 98% (3,501) of them have successfully completed all the assessment. The results indicated nearly half (1,585) of the students have started alcohol drink and 9.2% (327) of the students have started smoking. 183 (5%) of the students not only drink but also smoke. Of all students, 34 of them reported drug use in the study.

Conclusions: The number of secondary students who drink and/or smoke has risen to an alarming level. Control the alcohol and tobacco

use among adolescents is crucial to cultivate the healthy lifestyle before the new generation enters their adulthood. It is strongly recommended that health promotion programmes on alcohol and smoking cessation should be involved in the education system in Hong Kong.

Ab78
Monitoring perceptions, anticipated behaviour and psychological responses related to H5N1 influenza

JTF Lau[1], HY Tsui[1], JH Kim[1], PKS Chan[2], SM Griffiths[1]
[1]School of Public Health and Primary Care, CUHK
[2]Department of Microbiology, CUHK

The study aims to monitor changes in behavioural and emotional responses of human H5N1 in the community over a 28-month period (from November 2005 to February 2008).

Six identical cross-sectional surveys interviewed 3,527 Hong Kong Chinese adults by telephone in the 28 months. Given a hypothetical scenario that 2-3 new human-to-human H5N1 cases reported in Hong Kong, the trends in various H5N1-related risk perceptions, anticipated personal psychological responses, and anticipated personal preventive behaviours were investigated.

Over time, a decreased proportion of people felt susceptible to contracting H5N1, expected a large outbreak would eventually occur, believed that the impacts of H5N1 being worse than those of SARS, anticipated up-taking more types of preventive measures and experiencing mental distress, in case a small-scale outbreak started in Hong Kong (AOR from 0.27 to 0.43, p<0.001) but the public remained vigilant on public health behaviours such as hand-washing. Prevalence of misconceptions about mode of transmission, though declined, remained high; fatality of H5N1 remained largely underestimated. The SARS experience and unconfirmed beliefs about transmission modes were associated with variables on anticipated preventive behaviours and emotional distress.

During 2005 through 2008, respondents perceived a decreasing level of susceptibility, severity and anticipated stress towards a hypothetical human-to-human H5N1 outbreak, possibly due to the low efficiency of transmission. The public's general preparedness was still relatively good and rational even though people's preventive behaviours were less common. However, misconceptions were common. Public education is warranted to rectify these misconceptions.

Ab79
A longitudinal survey on psychological and behavioural responses in the Hong Kong general population at the pandemic phase of H1N1 epidemic

JTF Lau, NCY Yeung, KC Choi, SM Griffiths
School of Public Health and Primary Care, CUHK

To explore the changes in community responses along the progression of the H1N1 influenza epidemic in Hong Kong, this study conducted 6 longitudinal surveys (R1-6) from August 2009 through April 2010 among Hong Kong general population. A total of 503 participants were successfully invited at the baseline and completed the survey by anonymous telephone interviews. The retention rate for subsequent follow-up surveys was close to 90%.

People's knowledge about the modes of H1N1 transmission did not change significantly over time. Misconceptions reduced but beliefs about possible transmission of H1N1 via insect bites (18.9%) and water sources (24.8%) were still prevalent at R6. More participants believed that H1N1 would cause irreversible serious bodily damages (R1:16.9% to R6: 23.4%) and have a higher fatality than seasonal flu (R1: 44.3% to R6: 59.3%). People's perceived susceptibility in contracting H1N1 fluctuated but decreased over time, (R1:16.6%; R6: 7.7%) with a particularly high level at the peak flu season around September (R2: 25.2%).

Over 90% of participants perceived using face masks in public areas,

frequent hand-washing and avoiding crowded places could effectively prevent the spread of H1N1. Over 85% participants were wearing masks in case of ILI symptoms and around half of the respondents washed their hands more than 10 times every day at all rounds of survey. Avoidance behaviours reduced along the progression of the pandemic (e.g., avoiding going out unless necessary (R1: 41.2%; R6: 23.2%) and avoiding going to crowded places (R1: 55.7%; R6: 34.8%).

Percentages of participants feeling worried about contracting H1N1 (R1: 12.3%; R6: 3.7%, p<.001), feeling panic, much depressed or emotionally disturbed due to H1N1 significantly reduced (R1:16.3%; R6: 3.9%, p<.001). Participants generally believed in government's ability to control the H1N1 pandemic (R1: 77.1%; R6: 90.2%, p<.001), but less participants that the government should treat H1N1 in the same manner as seasonal flu.

Along the progression of the pandemic in Hong Kong, the general public maintained high level of preventive behaviours, plus a low and declining level of mental distress. Misconceptions reduced but were still noticeable. Perceived severity of H1N1 compared to seasonal flu increased, while susceptibility remained relatively low though some fluctuations observed. A high proportion of the public supported the government in treating H1N1 differently from seasonal flu. Public education is warranted to rectify these misconceptions, while a watchful step-down plan for H1N1 pandemic control may be better accepted for the effective prevention of both H1N1 and seasonal flu.

Ab80
A longitudinal survey to explore factors associated with acceptability of H1N1 vaccination in the Hong Kong general population at the pandemic phase of H1N1 epidemic

JTF Lau, NCY Yeung, KC Choi, SM Griffiths
School of Public Health and Primary Care, CUHK

To explore the association between people's perception towards H1N1 influenza and their intention to uptake H1N1 vaccination along the progression of the H1N1 influenza epidemic in Hong Kong, this study conducted 6 waves of longitudinal surveys from August 2009 through April 2010 among Hong Kong general population. A total of 503 participants were successfully invited at the baseline and completed the survey by anonymous telephone interviews. The retention rate for subsequent follow-up surveys was close to 90%.

Using General Estimating Equations (GEE) Modelling, results showed that those who were male, those who were aged <30, those who disagreed that there was no effective vaccine to prevent H1N1 transmission, those who disagreed that it does not matter to have H1N1, those who perceived high efficacy of H1N1 vaccine in preventing H1N1 (reference: compared to those perceived that uptake of H1N1 vaccination is not efficacious in preventing H1N1 transmission), those who perceived a higher fatality rate associated with H1N1 than that of seasonal influenza (reference: compared to those with the reversed belief), those who gave a passing score (5 out of 10) to government performance (reference: compared to those who gave a score lower than 5 marks) were more likely than others to show intention to uptake free vaccination. Intention to uptake free vaccination was also higher in the earlier waves of survey. Furthermore, the interaction between "wave" and perceived high efficacy of vaccination to prevent H1N1 was significant in predicting people's intention to uptake free vaccination.

The study captured how people's perceptions towards the properties of H1N1 and H1N1 vaccination associated with their intention to uptake H1N1 vaccination from months before to months after the launching of H1N1 vaccination scheme in Hong Kong. Higher perceived efficacy of H1N1 vaccination in preventing H1N1, higher risk of getting H1N1 and greater level of confidence towards the government are important determinants for intention to uptake free H1N1 vaccination. This not only provides valuable information for the local government and public health policy makers about people's intention to uptake H1N1 vaccination, but also provides implications for vaccine promotion strategies for potential emerging infectious diseases in the future.

Ab81
A longitudinal survey to explore factors associated with preventive behaviours and psychological responses towards the H1N1 influenza in the Hong Kong general population at the pandemic phase of H1N1 epidemic

JTF Lau, NCY Yeung, KC Choi, SM Griffiths
School of Public Health and Primary Care, CUHK

To explore how people's perception towards H1N1 influenza associate with their adoption of preventive behaviours (e.g., handwashing, facemask wearing, avoiding going to crowded places) and psychological responses (e.g., mental distress due to H1N1) along the progression of the H1N1 influenza epidemic in Hong Kong, this study conducted 6 waves of longitudinal surveys from August 2009 through April 2010 among Hong Kong general population. A total of 503 participants were successfully invited at the baseline and completed the survey by anonymous telephone interviews. The retention rate for subsequent follow-up surveys was close to 90%.

Using General Estimating Equations (GEE) Modelling, results showed that females and older respondents were more likely to wear facemasks and avoid going to crowded places or going out unless necessary. The absence of misconceptions about the modes of transmission and the higher level of perceived worry were associated with higher frequency of avoidance behaviours. Significant positive associations were found between people's perceived efficacy of preventive behaviors (like facemask wearing, avoidance behaviours) in preventing H1N1 and their adoption of such preventive behaviours. On the other hand, those who disagreed with the statement that it does not matter to have H1N1, those who believed that the fatality rate of H1N1 was higher than that of seasonal flu, those who felt worried about themselves and their family members in contracting H1N1 were more likely than others to express mental distress due to H1N1.

The study showed that demographic factors, knowledge related to modes of transmission, risk perceptions towards H1N1 and perceived efficacy of preventive measures could all contribute to people's adoption of frequent handwashing, facemask wearing and avoidance behaviours. Among these independent variables, perceived efficacy of preventive behaviours is a very stable determinant of its corresponding preventive behaviours. In contrast, risk perceptions towards H1N1 (e.g., perceived susceptibility and perceived severity of H1N1) were more predictive of people's level of mental distress. The findings provide important implications for the government and health policy makers to tailor-make educational or promotional campaigns for better pandemic control.

Ab100
Paternal smoking was associated with childhood overweight: evidence from the Hong Kong's "Children of 1997" birth cohort

MK Kwok, CM Schooling, TH Lam, GM Leung
Life Course and Lifestyle Epidemiology Group, School of Public Health, HKU

Aims: Paternal smoking may be a modifiable cause of childhood overweight. However, smoking and overweight are socially patterned. This study examined in a non-Western socio-historical context whether pre- or post-natal secondhand smoke exposure in children of non-smoking mothers was associated with higher childhood body mass index (BMI) and clarified whether the observed associations were biologically-mediated or socio-economically confounded.

Methods: 6,710 and 6,519 children of non-smoking mothers (n=7,924) with BMI at about 7 and 11 years respectively from a population-representative (n=8,327), Hong Kong Chinese birth cohort, "Children of 1997", born in April and May 1997 were included in the analysis.

Results: Compared to children with no SHS exposure, daily paternal smoking increased mean BMI z-scores, but not height, at 7 years (difference 0.10, 95% confidence interval (CI) 0.02 to 0.19) and at 11 years (0.16, 0.07 to 0.26), adjusted for sex, birth order, socio-economic position (SEP), mother's place of birth, breastfeeding, serious morbidity and pubertal status.

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Conclusions: Our findings, although preliminary, suggest that an association of paternal smoking with child overweight could possibly be biologically mediated. Given the known harms of smoking, reducing SHS exposure from conception as a precautionary action for childhood overweight might be warranted.

Ab191
The influence of country of study on student responsiveness to the H1N1 pandemic

SM Griffiths, AH Wong, JH Kim, TKC Yung, JTF Lau
School of Public Health and Primary Care, CUHK

Background: Chinese University of Hong Kong International Summer Programme started during the Hong Kong government's containment phase of the H1N1 pandemic of 2009. The original intention of the study was to evaluate student compliance and opinions on preventive measures prior to and during the H1N1 pandemic. However, one week after the start of the programme, the first case of H1N1 was confirmed amongst the students, making it possible to study their attitudes and behaviours to the emerging infections amongst the group.

Methods: Cross sectional questionnaire based study of students attending the International Summer Programme on July 2009.

Results: Students generally complied with preventive measures taken by the university during the containment phase, and responded positively to the measures taken. Significant differences in compliance and perceived necessity for preventive strategies / actions were found among students studying in Singapore, Hong Kong, and USA. Students studying in Singapore were the most compliant with guidelines and those from the U.S. the least so. Singapore-based students were also significantly more likely to comply with all measures and take prophylactic, prescribed antiviral medication than U.S. students, whereas Hong Kong students, though generally more compliant, were significantly less likely to practice certain measures.

Conclusions: Most students responded favourably to the advice provided by the university and complied with precautionary measures as well as with emergency measures. Responses differed significantly by their country of study both for precautionary behaviour prior to the summer school and to response during the outbreak of H1N1. Such differences should be taken into account when formulating policies for controlling spread of infection in a highly mobile group, especially at Hong Kong due to its role as an international hub.

Ab194
Willingness to accept H1N1 pandemic influenza vaccine: a cross-sectional study of Hong Kong community nurses

SYS Wong[1], ELY Wong[1], K Kung[2], SM Griffiths[1]
[1]School of Public Health and Primary Care, CUHK
[2]HA

Background: The 2009 pandemic of influenza A(H1N1) infection has alerted many governments to make preparedness plan to control the spread of influenza A(H1N1) infection. Vaccination for influenza is one of the most important primary preventative measures to reduce the disease burden. Our study aim is to assess the willingness of nurses who work for the community nursing service (CNS) in Hong Kong on their acceptance of pre-pandemic influenza vaccination.

Methods: 401 questionnaires were posted to community nurses with 67% of response rate. Results of 267 respondents on their willingness to accept influenza A(H1N1) vaccine were analysed.

Results: Twenty-seven percent of respondents were willing to accept influenza vaccination if vaccines were available. Having been vaccinated for seasonable influenza in the previous 12 months and being over 39 years of age were significantly independently associated with their willingness to accept influenza A(H1N1) vaccination (p<0.01 & p=0.04 respectively).

Conclusions: Similar to previous findings conducted in hospital healthcare workers, we showed that the willingness of community nurses to accept influenza A(H1N1) vaccination is low. Further research is needed to increase vaccination acceptability in this group of healthcare workers who are at an increased risk of contracting influenza infection in the context of a pandemic.

Ab195
Concern in swine flu pandemic among the Hong Kong physician working in outpatient clinic

ELY Wong, CSC Fung, K Kung, SYS Wong, SM Griffiths
School of Public Health and Primary Care, CUHK

Background: Influenza pandemic creates increased capacity needs for health care service provision. Physicians and other health professionals are at the forefront to deal with this increased demand for services and may suffer from significant psychological stress as a result of the pandemic. This study aims to explore the stress levels and concerns of the physicians working in outpatient clinics during swine flu pandemic.

Methods: A cross-sectional study using self-administered questionnaire was performed to collect data from 2000 randomly selected physicians from the list of 11,278 registered physicians in Hong Kong between May to July 2009. The response rate was 33% (666/2000); 629 (94%) out of 666 respondents were working in outpatient clinic in either private setting or governmental organisation. The questionnaire covered 9 aspects of stress with a score range of 0-100, where higher score means more stressful.

Results: The majority of physicians (n=629) working in community setting suffered from depressive mood (mean score= 86.9; SD=18.5) and emotional stress (mean score=80.6; SD =23.4) due to the swine flu pandemic in Hong Kong. The mean score of stressfulness are 72.4 (SD 24.5) for "fear to deal with H1N1 patients"; 67.6 (SD 27.2) for "worried to be infected due to job"; 58.6 (SD 29.6) for "worried infecting family"; 48 (SD 26.4) for confidence in protecting self/family; 67 (SD 25.3) for "family worried being infected"; 76.4 (SD 23.4) for "the daily activity is affected by H1N1"; and 76.6 (SD 24.3) for "quality of life is affected by H1N1." Half (51.8%) of the respondents would like to have more training / professional education on how to deal with H1N1.

Conclusions: Human resources play an important role in managing influenza pandemic. Results indicate that physicians working in the community setting experienced stress during the swine flu pandemic particularly related to "fear to deal with H1N1 patients" and they wanted more infection control training. More infection control training may attenuate physicians' stress and may strengthen their ability of fighting against potential influenza pandemic in the future.

Ab198
H5N1 knowledge, attitudes and practices of poultry workers in Hong Kong during the H1N1 pandemic

JH Kim, F Lo, E Kwong, KK Cheuk, SS Lee, W Goggins, SM Griffiths
School of Public Health and Primary Care, CUHK

Background and objectives: Live poultry workers represent a high-risk group for H5N1 Avian influenza due to their high-level of exposure to birds and their body parts. Few studies have been done on the knowledge, attitudes and behaviours of live poultry workers in Hong Kong, despite the fact that Hong Kong has experienced a number of H5N1 outbreaks in poultry workers. These workers represent a high-risk group for infection by H5N1 and should be examined to determine whether there are knowledge gaps, attitudinal barriers or prevalent risk behaviours that are amenable to intervention.

Methods: An anonymous, self-administered questionnaire was completed by 250 poultry workers in 2009 (response rate=67%) in order to examine the relationship between worker-related characteristics, knowledge of H5N1, attitudes towards avian influenza and health-related behaviours.

Results: The majority (78%) believed that they can protect themselves from H5N1. For perceived benefits, most of them have high perceived benefits from hand-washing with soap (70%), using gloves (60%), and vaccination of poultry (56%), but only few of them perceived goggle use (11%), sterilising cutting boards (32%), and keeping distance from birds (23%) as useful. For main barriers to preventive behaviours, 61% believe that wearing face mask will reduce business, 66% said following hygiene measures is difficult during peak hours, and 80% never received any infection control training. They had lower level of perceived susceptibility to H5N1, as 86% believe that they are not susceptible to H5N1 and 59% believe that they have antibodies to H5N1. For perceived severity, 88% believe H5N1 has lower fatality than SARS. As cue of action, 58% see public announcements as effective reminders. For knowledge of H5N1, most of them know fever and breathing problems are symptoms of human H5N1 infection, but not many know that diarrhoea, vomiting are also possible symptoms. For behaviours, most of them wash with soap and wear personal protection equipment during their work, but handling live birds with bare hands are also common.

Conclusions: Live poultry workers should engage in a dialogue with the government to determine the realistic H5N1-prevention regulations that insure worker safety while allowing efficient work practices. Health promotion among this occupational group shows promise for preventing future H5N1 outbreaks. Further analyses will be conducted to determine the factors associated with higher H5N1 risk behaviours.

Ab215
Short sleep duration and adiposity in children: evidence from Hong Kong's "Children of 1997" birth cohort

LA Mitchell-Wong[2], GM Leung[1], LL Hui[1], C Yau[1], TH Lam[1], CM Schooling[1]
[1]Life Course and Lifestyle Epidemiology Group, School of Public Health, HKU
[2]MPH programme, School of Public Health, HKU

Background: There is a burgeoning epidemic of childhood adiposity, with potentially detrimental life long consequences for health. We assessed if short sleep duration was associated with adiposity in children.

Methods: We used linear and logistic regression to estimate the adjusted association of sleep duration with clinically assessed childhood body mass index (BMI) z-score, relative to the World Health Organization 2007 growth references, and overweight or obesity status, relative to the International Obesity Task Force guidelines, at ~11 years, in a cross-sectional analysis of a large population-representative Hong Kong Chinese birth cohort comprising 88% of all births in April and May 1997. Sleep duration was obtained from a parental self-administered questionnaire detailing activities undertaken the previous day. We used multiple imputation for missing exposures and confounders.

Results: Of the original 8,327 cohort members, as of 30 June 2010, 7,933 were alive, had not withdrawn and were living in Hong Kong. Of these, 3,682 returned a parent completed questionnaire at about 11 years and 6,796 also had BMI measured at the same age. Many children (38%) slept for ≤8 hours. There was a negative association between sleep duration and BMI z-score (0.14 higher for sleep ≤8 hours compared to sleep >8 hours, 95% confidence interval (CI) 0.04 to 0.23) adjusted for sex, mother's place of birth, highest parental education level, and time spent studying, playing sport, watching television, playing video/computer games and playing with friends. Similarly, children with short sleep duration (≤8 hours) were more likely to be overweight or obese (odds ratio (OR) 1.28, 95% CI 1.11 to 1.49) after adjusting for the same factors.

Conclusions: Hong Kong children have below recommended sleep durations. Consistent with previous studies, shorter sleep duration was associated with adiposity. Short sleep duration may be a modifiable risk factor for obesity in children.

Ab226
Risk perception and live poultry exposure in Hong Kong, Guangzhou, Thailand and Vietnam

R Fielding[1], GM Leung[1], WWT Lam[1], CQ Jiang[2], C Sitthi-Amorn[3], LV Ahn[4], YM Liu[2], WS Zhang[2], QY Liao[1]
[1]School of Public Health, HKU, Hong Kong
[2]No.12 People's Hospital, Guangzhou, China
[3]College of Public Health, Chulalongkorn University, Bangkok, Thailand
[4]Hanoi School of Public Health, University of Hanoi, Hanoi, Viet Nam

Aim: To assess variations in poultry purchasing risk behaviour and perception, and identify determinants in four Asian locations (urban – Hong Kong and Guangzhou, and rural Vietnam and Thailand). 6,538 respondents completed an interview-based structured questionnaire administered face-to-face or by telephone (HK).

Results: 1. Exposures: Urban exposure to live poultry estimated using a simple standardised numerical substitution for reported buying rate (daily, weekly, monthly, and so on) then adjusted for gender and touching frequencies was mostly through market purchasing of live chickens. Retail buying crude exposure levels among consumers were estimated at 0.76/buying household/year (HK), 10.06 e/bh/y (Vietnam), 5.05 e/bh/y (Thailand) and 6.8 e/bh/y (Guangzhou). Where there was domestic poultry, then husbandry exposures were crudely estimated based on one contact/household member per week (lower bound) and per day (upper bound). Domestic husbandry exposures were then between ~175 - ~1,230/exposures/raising household/year (e/h/y) (Vietnam, 53% of households), ~197 - ~1,387 e/h/y (Thailand, 32% of households), and ~190 – 1,332 e/h/y (Guangzhou, 20% of households). 2. Risk perception. Buying live chickens was perceived as health risky by 41% (95%CI 39-43%) in HK, 79% (77-81%) in Vietnam, 86% (84-88%) and 58% (55-60%) in Guangzhou. Odds of family sickness from buying live poultry were perceived as "Likely" or "Very Likely" by 20% (18-22%) of HK, 34% (32-36%) of Vietnamese, 3% (0-6%) of Thai and 18% (16-20%) of Guangzhou respondents. Purchasing behaviour was unrelated to perceived personal health risk from buying live poultry in HK, Vietnam and Thailand and also perceived odds of family sickness in HK only. In Vietnam, Thailand and Guangzhou there were marked differences in purchasing behaviour by perceived odds of family sickness, with those not buying perceiving significantly lower odds. Generally, perceived risks of family sickness from domestic husbandry were moderate in Vietnam (31%, 28-33%), Thailand (26%, 24-28%) and Guangzhou (35%, 21-40%). Moderate numbers agreed or strongly agreed that live animal market sales are an important disease risk, and that SARS/HPAI reflect unsustainable husbandry practices: 36% (34-38%) and 38% (36-40%) respectively in HK, 58% (56-60%) and 44% (42-46%) in Vietnam, 52% (47-55%) and 42%% (39-45%) in Thailand, and 36% (34-38%) and 21% (19-23%) of Guangzhou respondents.

Conclusions: Exposures to live poultry remained high whereas perceived risk was variably related to purchasing behaviour.

Ab240
Factor structure of the ENRICH Marital Satisfaction Scale: an investigation of wording effects

DYP Leung, SSC Chan, J Yau, TH Lam
School of Nursing, HKU

Background: Men make up the majority of smokers in Hong Kong and many Asian countries. Our preliminary observation suggested that non-smoking women might be unwilling to implement a no-smoking policy at home or help their smoking husbands to quit. They believed such advice might not be welcome and hence harmful to their marital relationship. The ENRICH Marital Satisfaction Scale comprises 15-item negatively and positively worded items in 2 subscales - idealistic distortion (5-items) and marital satisfaction (10-items). Similar to other instruments the inclusion of both negatively and positively worded items may prevent response bias, but also introduce systematic bias.

Aims: Our aim is to examine the response and systematic bias associated with the 10-item ENRICH Marital Satisfaction (EMS) scale among Chinese mothers and fathers.

Results: A total of 1157 families with a smoking father, a non-smoking mother and a child under 18 months were recruited. Confirmatory factor analysis was conducted to examine the factor structure of the 10-item ENRICH Marital Satisfaction (EMS) scale for the father and mother samples respectively. First, a 1-factor model as hypothesised by the instrument developers, then two correlated traits, correlated methods (CTCM) models with one modelling the positively worded items as a distinct factor (CTCM-positive) and the other modelling the negatively worded items as a distinct factor (CTCM-negative) were fitted to the samples of the fathers and the mothers respectively using confirmatory factor analysis (CFA). The mean age of the fathers was 35.5±7.0 years, 81% had completed secondary school and 96% were currently employed. The mean age of the mothers was 31.2±4.9 years, 81% had completed secondary school and 57% were housewives. A total of 1043 fathers and 1070 mothers completed the ENRICH Martial Satisfaction scale at baseline. Results revealed the CTCM-negative model provided a superior fit to both the original 1-factor model and the CTCM-positive model to both the father and mother samples.

Conclusions: The results provided preliminary evidence that the wording effects associated with negatively worded items in EMS scale may be estimated as a distinct latent variable. The findings highlight the importance of modelling the wording effects in measuring marital satisfaction using the EMS scale among Chinese couples. Clinical practitioners and researchers are encouraged to use the scale in their work to better understanding their clients' spousal relationship before implementing interventions which has a potential implication on spousal relationships.

Ab241
Working with the community to reduce tobacco use in women: evaluating the first gender-specific smoking cessation programme in Hong Kong

SSC Chan[1], DYP Leung[1], ZSF Wan[1], ICY Fu[1], TH Lam[2]
[1]School of Nursing, HKU
[2]School of Public Health, HKU

Background: In contrast to the decreasing smoking prevalence in male smokers, the prevalence of women smokers in Hong Kong has not decreased and remained about 4% in the last decade. Tobacco use leads to specific damage to women's health including cervical cancer, miscarriage and birth defect. Previous studies showed that women smokers perceived more difficulties and had lower confidence in quitting. Hence, we worked with the community woman organisations to arouse the awareness of health hazards of smoking, and promote quitting among woman smokers, through partnership, capacity building, and the delivery of an accessible and gender-specific smoking cessation programme.

Methods: We first organised a Women Against Tobacco Taskforce (WATT) with 14 community woman organisations, built capacity in smoking cessation counselling skills among their members, and designed and delivered a gender-specific smoking cessation programme including hotline and face-to-face programmes for female smokers in November 2006. The programme included answering public inquiries, liaising with the WATT members, and delivering a stage-matched smoking cessation counselling for woman smokers by trained nurse counsellors. The smoking cessation intervention included simple health assessments, smoking history taking, and designing an individualised quit plan for the client. Clients were contacted at 1-week and 1-month after initial contact to receive further support on quitting, and follow-up at 3- and 6-month to monitor quitting status. This paper examines the changes in daily cigarette consumption and self-efficacy to resist smoking before and after receiving the intervention.

Results: Up to 31 October 2010, we have received 689 calls and recruited 349 female smokers. On average, the participants were 35.0±10.2 years old, have started smoking at their early adulthood (18.1±5.7 years old) and smoked 14.3±8.5 cigarettes daily. A total of 332 participants were eligible for 6-month follow up and 85.1% of them were successfully followed. Using intention-to-treat analysis, the self-reported 7-day point prevalence quit rate was 26.5% (88/332). For those who failed to quit at 6-month, their daily cigarette consumption were significantly reduced from 15.2±9.0 to 9.4±6.5 cigarettes (p<0.01). Their self-efficacy against both internal (2.1±0.6 to 2.3±0.7, p<0.01) and external stimuli (2.6±0.5 to 2.7±0.6, p<0.017) were also strengthened after counseling.

Conclusions: The HKU's gender-specific smoking cessation programme is the first of its kind in Hong Kong, and the intervention has achieved a quit rate (26.5%), higher than the local smoking cessation hotline and clinic targeting both men and women. Additionally, it also helped those who continued to smoke to reduce their tobacco use and improve their self-efficacy to resist smoking, which are good starting points for future quitting. These study findings showed the effectiveness of our programme and provided evidence for the policy makers to plan for future development on gender-specific smoking cessation services.

Ab243
Promoting smoking cessation among youth smokers: the effectiveness of the first Youth Quitline in Hong Kong

SSC Chan[1], DYP Leung[1], DCN Wong[1], DYT Fong[1], AYM Leung[1],
DOB Lam[2], TH Lam[3]
[1]School of Nursing, HKU
[2]Department of Social Work and Social Administration, HKU
[3]School of Public Health, HKU

Background: Smoking is the single most preventable cause of diseases such as cancers, cardiovascular diseases, chronic lung diseases, and attributable to one-fifth of all deaths in Hong Kong. Tobacco smoking among adolescents presents a significant and growing public health problem worldwide. In Hong Kong, the number of daily smokers of teenagers aged 15-19 risen from 11,800 (2.8%) in 1998 to 15,700(3.5%) in 2005.

Methods: We established the first Youth Quitline (YQ) in Hong Kong in August 2005. We first trained secondary and university students to be peer counsellors to provide smoking cessation counselling to youth smokers aged 12 to 25 years. At baseline, we assessed the smoking history and designed an individualised quit plan for the youth smokers We contacted the smoker at 1-week and 1-month to provide encouragements and assess smoking status, and follow up at 3-month and 6-month to assess quitting outcomes.

Results: From August 2005 to November 2009, the YQ received a total of 3,760 calls and recruited 618 youth smokers, who received smoking cessation counselling. About 74% were males, 52% aged below 18 years, 61% were students and 32% were employed. On average, youth callers have been smoking for 4.5 years (ranged from less than 1 year to 16.5 years), 73% smoked daily, 60% smoked half pack or less during the days they smoked. Over half (56%) intended to quit within the next 30 days. To improve health (76%) and being encouraged/enforced by others (31%) were the two most common reasons to quit. Over two-third (68.5%) of the youth smokers were successfully followed up at 6-month. Using intention-to-treat analysis, 24% were able to quit smoking (no smoking in the past 7 days), and for those who continue to smoke, 27% reported a reduction in daily cigarette consumption compared to baseline, and 33% had made at least one quit attempt in the past 6 months.

Conclusions: The YQ has successfully reached a significant number of youth smokers and has achieved a promising quit rate. Although it seems to be effective in helping youth smokers quit, reducing their cigarette consumption and initiating quit attempts, more youth smokers should be encouraged to call the YQ as quitting early is important to prevent long term addiction. A systematic social marketing campaign targeting youth smokers is urgently needed to de-normalise smoking among the younger generation.

Ab244
The impact of the smoke-free legislation on smoking reduction among youth smokers in Hong Kong

SSC Chan[1], DYP Leung[1], AYM Leung[1], DOB Lam[2], DYT Fong[1],
TH Lam[3]
[1]School of Nursing, HKU
[2]Department of Social Work and Social Administration, HKU
[3]School of Public Health, HKU

Background: Most adult smokers started smoking when they were young and many were resistant to cessation attempts. Previous studies showed that there was an association between restrictions

on smoking in public places and the youth smoking prevalence. A smoke-free legislation which restricts smoking in all indoor areas and public facilities was implemented in Hong Kong on 1 Jan 2007. We examined the impact of the legislation on the reduction in cigarette consumption among youth smokers who called the Hong Kong Youth Quitline (YQ).

Methods: We compared the youth callers recruited before the legislation (73 weeks: Pre-legislation group), and after 1 Jan 2007 (78 weeks: Post-legislation group). They are ethnic Chinese, aged 12 to 25, smoked ≥1 cigarette in the past 30 days, received smoking cessation intervention provided by trained peer counsellors, and followed-up at 6-month via telephone. Baseline factors associated with smoking reduction at 6-month were submitted to a multivariate logistic regression analysis with backward elimination for identification of independent variables.

Results: A total of 254 and 288 youth smokers formed the pre- and post-legislation groups. 73% were male, 61% were students, and 61% had mild nicotine dependency level. On average, they were 18 years old, started smoking at 14 years old and consumed 11 cigarettes daily. The post-legislation group were younger (pre-legislation vs post-legislation) (19 vs 17 years old; p<0.001), started smoking earlier (14 vs 13 years old, p=0.02), and more were students (55% vs 67%, p=0.01). By intention-to-treat analysis, the post-legislation group had higher proportions in reducing cigarette consumption by at least half including quitters (45% vs 36%, p=0.04). Youth smokers who were in the preparation stage, smoked fewer days in the last week, have more confidence in quitting, and being in the post-legislation group, were more likely to reduce their cigarette consumption by at least half compared to baseline.

Conclusions: The smoke-free legislation seemed to have a positive impact on the smoking behaviour among youth smokers who sought cessation advice from the YQ after in the post-legislation period. Although smokers may not quit immediately when the smoke-free legislation was enacted, reducing smoking is an important first step to eventually reach complete cessation among youth smokers in Hong Kong. More public education on smoking cessation targeting youth should be promoted and longitudinal follow-up is needed to monitor the changes in the youth smoking and quitting behaviours in the context of the smoke-free legislation.

Ref. No. SHS-T03

Ab246
The impact of the smoke-free legislation on the mother's actions in protecting their children from secondhand smoke exposure and supporting their husbands to quit smoking in Hong Kong: a two-group comparison

SSC Chan[1], DYP Leung[1], YW Mak[2], GM Leung[3], TH Lam[3]
[1]School of Nursing, HKU
[2]School of Nursing, PolyU
[3]School of Public Health, HKU

Background: In Hong Kong, men comprise the majority of smokers and exposing their family members to secondhand smoke (SHS) at home has been a serious problem. Non-smoking women might be more motivated to help their husbands quit smoking for their own health, and consequently reduce their children's exposure to secondhand smoke at home after the implementation of the smoke-free legislation on 1 Jan 2007.

Methods: Two cross-sectional samples of Chinese non-smoking mothers living with a smoking father and a child aged ≤12 years old were recruited at Maternal and Child Health Centres before (January to April 2005) and after (June 2007 to August 2008) the implementation of the smoke-free legislation. Both parents were asked to complete a corresponding questionnaire either via face-to-face interview or telephone. Chi-square tests compared proportions of mothers' actions taken to protect the children from SHS exposure and help fathers quit smoking between the two groups.

Results: The pre-legislation group comprised of 186 mothers and the post-legislation group comprised of 737 mothers who completed the questionnaires. Mothers in the post-legislation group were significantly older than the pre-legislation group (mean age: 36.6±5.7 years vs 31.5±4.8 years; p<0.001) while almost all mothers in both groups perceived a good spousal relationship (98.1% vs 100%, p=0.09). Among those mothers who reported SHS exposure to their children

at home, significantly more mothers in the post-legislation group practiced 7 out of 9 specific actions in protecting their children from SHS exposure, and the differences were substantial (15.45 – 78.1%). More mothers in the post-legislation group had advised the father to quit compared to the pre-legislation group (>9 times: 22.0% vs 0.5%, p<0.001). Furthermore, more mothers in the post-legislation group had taken actions to help the father quit in 2 actions (Placed a no-smoking sign at home: 8.5% vs. 1.6%, p=0.001; discussed with father the needs of quitting: 9.3% vs. 0.8%, p<0.001) but less mothers gave the fathers a smoking cessation booklet (6.3% vs. 17.7%, p=0.004).

Conclusions: The findings indicated that the smoke-free legislation has some initial positive impact in protecting non-smokers, such as mothers and children at home. More mothers in the post-legislation group have increased their actions to protect their children from SHS exposure and advising their smoking husbands to quit. However, more spousal support to the fathers in the quitting process is needed, and it calls for more public education to the mothers and research in this area, as social support are key components to effective smoking cessation interventions. Finally, population-based and longitudinal studies are recommended to examine the long term impact of the smoke-free legislation.

Ref. No. SHS-T02

Ab247
Differences in the knowledge and attitude towards smoking, secondhand smoke, and smoking cessation among smoking fathers and non-smoking mothers

SSC Chan[1], JPL Yau[1], DYP Leung[1], GM Leung[2], K Emmons[3], AYM Leung[1], TH Lam[2]
[1]School of Nursing, HKU
[2]School of Public Health, HKU
[3]Harvard Medical School, USA

Background: Spousal support to successful tobacco quitting is well documented in previous studies. Without accurate and sufficient knowledge about the harmful effects from smoking and secondhand smoke (SHS) exposure, smoking cessation intervention would be less competent when we incorporate spousal support into the intervention. This paper aims to compare the knowledge of health hazard of smoking and SHS and the attitudes of smoking cessation of smoking father and non-smoking mother.

Methods: The study is a multi-centre randomised controlled trial to evaluate the effectiveness of a family intervention to prevent exposure of SHS at home and to help fathers to quit smoking from June 2008 to October 2009. Families with a smoking father, non-smoking mother and a newborn under 18 months were recruited at 22 Maternal and Child Health Centres (MCHCs). Consented couples were invited to complete baseline questionnaires including their knowledge of the hazards of smoking (5 items); hazards of SHS (4 items) on health; and their attitudes towards smoking cessation (5 items). Paired t-tests were used to compare the two knowledge and attitude scores between the matched couples, respectively.

Results: 1,086 smoking fathers and 1,145 non-smoking mothers completed the baseline questionnaires. The mean age of fathers and mothers were 35.5 (±7.0) and 31.2 (±4.9) respectively. On average, fathers had a higher knowledge score on the hazards of smoking (4.63±0.79 vs. 4.08±0.44; p<0.001) on a scale of 0-5 but lower score on hazards of SHS (3.88±0.54 vs 3.95±0.30; p=0.001; range: 0-4) than the mothers. However, mothers reported a more positive attitudes towards smoking cessation (3.53±0.91 vs. 3.43±1.17; p=0.02; range: 0-5) than the fathers.

Conclusions: This study was conducted after the enactment of the Smoking Ordinance on January 1, 2007 and the results showed that the fathers and mothers of newborns had good general knowledge about the hazards of smoking but fathers seemed to be less knowledgeable regarding the SHS effects on health. Although the mothers seemed to report more positive responses towards smoking cessation, nevertheless a greater difference is expected between smokers (fathers) and non-smokers (mothers). The results highlighted the need to arouse the awareness of parents on the serious health hazards of SHS to the newborns and non-smokers living with a smoker, who could be very vulnerable to household SHS exposure. More public education and interventions to empower non-smokers to protect their

own right and their children to the exposure of SHS and to implement household no-smoking policy as a way to minimise household SHS exposure.

Ab250
Relationship between personality and length of abstinence among Chinese smokers after treatment

DYP Leung, TH Lam, SSC Chan
School of Nursing, HKU

Background: Research suggests some personality traits may be relevant to engagement in smoking but few studies examined the association between personality traits and smoking cessation among smokers.

Aims: This study aims to determine whether personality traits correlate with the length of abstinence of smokers who had received cessation counselling in a Chinese population.

Methods: A cross-sectional telephone follow-up (average 7 years) survey was conducted by trained telephone interviewers from Feb to Aug 2008. The participants were 1,173 Chinese smokers who had attended the first smoking cessation clinic in Hong Kong from Aug 2000 to Jan 2002 and received stage-matched individualised cessation counselling. Three lucky draws of prize HK$1,000 each were offered to boost the response rate. We computed correlations of the five personality traits (Neuroticism, Extraversion, Openness to Experience, Conscientiousness and Agreeableness) and length of abstinence (in months) among self-reported quitters at the follow-up.

Results: A total of 480 participants completed the survey (a response rate of 41%), 152 refused, 522 were lost to contact and 19 were reported dead. Compared to those not completed the survey, more completers were male (83.8% vs 76.0%; p=0.002) and fewer were married (33.5% vs 47.5%; p<0.001). Participants who completed the follow-up survey were statistically significantly older at baseline (40.6±12.0 years vs 37.3±14.3 years; p=0.001) and older when starting smoking (18.2±4.6 years vs 17.6±4.8 years; p=0.02). 207 (43%) reported did not smoking in the past 30 days at the time of follow-up and their mean length of abstinence was 54.3±31.8 months with a range of 1-120 months. Among the self-reported quitters who had provided completed data on length of abstinence and five personality traits (n=199), the length of abstinence was significantly and positively correlated with conscientiousness (r=0.185, p=0.012) and negatively with neuroticism (r=-0.205, p=0.004).

Conclusions: The results revealed that length of abstinence were associated with certain personality profile among Chinese smokers who had received smoking cessation counselling, reflecting smokers with different personality profiles might had responded differently to the stage-matched individualised smoking cessation counselling currently providing in Hong Kong. The findings suggest there might be a need for the development of tailor-made health education programmes to promote smoking cessation among Chinese smokers who were more neurotic.

Behaviour

Ab11
Role of zinc finger E-box binding factor 1 modulating latent-lytic switch of Epstein-Barr virus in gastric cancer

J Zhao, H Jin, KF Cheung, S Zhang, X Li, ESH Chu, CW Wu, JJY Sung, J Yu
Institute of Digestive Disease and Department of Medicine and Therapeutics, CUHK

Background: Recent studies have shown Epstein-Barr virus (EBV) infection is related to the development of gastric cancer. In particular, latent EBV infection usually established persistently and promoted tumour progression. The zinc finger E-box binding factor 1 (ZEB1) mediated transcriptional silencing of intermediate-early genes and induced EBV infection from lytic to latent stage.

Aims: We aim to study the effect of ZEB1 on modulating latent-lytic switch in gastric cancer, and to explore the potential of ZEB1 as a novel molecular target for the intervention of EBV associated gastric cancer (EBVaGc).

Methods: Gastric cancer cell-lines with latent (YCC10 cell-line) and lytic (AGS-EBV infected cell-line) EBV infection were used in this study. Loss or gain function of ZEB1 was obtained by ZEB1 siRNA knock-down or forced re-expression experiments, respectively. The modulation of the intermediate-early gene and apoptotic mediators were assessed by real time RT-PCR and Western blot. Cell growth was evaluated by cell viability assay and colony formation assay, and cell cycle by flow cytometry analysis.

Results: siRNA-mediated knockdown of ZEB1 in latent EBV infected cell-line YCC10 triggered a 3-fold enhanced expression of BZLF1, an intermediate-early gene of EBV, but a 5-fold reduction in expression of EBV nuclear antigen 1 (EBNA1), a gene that plays essential roles in enabling the replication and persistence of EBV genomes in latently infected cells and activating EBV latent gene expression. By doing so, knock-down of ZEB1 in YCC10 significantly inhibited cell viability (100% to 84%, P<0.01), suppressed cell proliferation as evidenced by reduced S phase cells (P=0.005), caused cell cycle arrest in G2M phase (P=0.006) and induced cell apoptosis (4.6±0.15% to 7.1±1.36%, P<0.05). The induction of cell apoptosis is confirmed by the cleavage of caspase-3 and PARP. On the other hand, over-expression of ZEB1 in lytic EBV infected cell line AGS-EBV through transient transfection significantly increased cell viability (P<0.01), induced S phase cell number (32.9±1.17% to 40.3±23.89%, P<0.05) and promoted colony formation (P<0.01).

Conclusions: ZEB1 is involved in the latent-lytic switch of EBV associated gastric cancer. Inhibition of ZEB1 may be a promising approach for the treatment of EBVaGc.

Ab43
Factors and outcomes of oral mucositis in paediatric patients undergoing chemotherapy for the treatment of cancer

JJF Cheng[1], V Lee[2], HLYuen[3], R Li[4], JB Epstein[5], W Goggins[6], DR Thompson[7]
[1]The Nethersole School of Nursing, CUHK
[2]Children Cancer Center, Department of Paediatrics, PWH
[3]Department of Paediatrics, QEH
[4]Department of Paediatrics, TMH
[5]Department of Oral Medicine and Diagnostic Sciences, University of Illinois, USA
[6]School of Public Health and Primary Care, CUHK
[7]Department of Health Sciences & Department of Cardiovascular Sciences, University of Leicester, UK

Background: Oral mucositis is a significant clinical problem afflicting most paediatric patients receiving cancer therapy. The objectives of this study were to determine the factors associated with OM for paediatric patients who are undergoing chemotherapy for the treatment of cancer, to describe the clinical, economic, and patient-reported outcomes of OM, and to compare those outcomes among paediatric patients who develop OM, by severity, with those who do not develop OM.

Methods: This study employed a multi-centre, prospective, observational cohort study design. A total of 147 subjects who were 6 to 18 years of age and treated with stomatotoxic chemotherapy were recruited. They were asked to use a daily diary to complete the Chinese version of the Mouth and Throat Soreness-Related Questions of the Oral Mucositis Daily Questionnaire during the first 14 days after the start of chemotherapy (days 1-14), the Chinese version of the State Anxiety Scale for Children and the Oropharyngeal Mucositis Quality of Life Scale at baseline, day 7, and day 14. Demographic and clinical data were collected from interviews and subjects' medical records. Data were analysed in two major steps: first, by performing univariate analysis; and second, by performing multivariate analysis.

Results: Overall, 41% (n=57) of the paediatric patients developed OM; in 23% (n=32) and 18% (n=25) the OM was non-severe and severe, respectively. The incidence of non-severe and severe limitations in swallowing, drinking, eating, speaking, and sleeping resulting from OM ranged from 18% to 35%. Factors that were found to be significantly associated with an increased risk and early onset of OM included a prior history of OM, severe neutropaenia at nadir, and a high anxiety level, after controlling for the chemotherapy regimen (p < 0.01) in the multivariate model. Associations exist between OM and adverse clinical and patient-reported outcomes (p < 0.05).

Conclusions: OM is common among paediatric patients receiving chemotherapy. In addition, paediatric patients who are neutropaenic, as well as those with high anxiety levels or a history of prior OM have a greater risk and an earlier onset of OM. The consequences that OM exerts have negative effects on paediatric patients' oral functional status and quality of life.

Ab47
Health status and health-related quality of life among childhood cancer survivors in Hong Kong: a comparison between the survivors and their siblings

CWH Chan, W Goggins, KKF Cheng, WT Chien, CK Li, HL Yuen, CK Li
The Nethersole School of Nursing, CUHK

Aims: This study aimed to explore the health status and health-related quality of life (HRQOL) of adolescent and young adult survivors of childhood cancer who had received cancer treatment in the last two decades.

Methods: Sujects fufilling the following criteria were recruited: had a diagnosis of childhood cancer prior to age 19, off-treatment for 2 years or more and survival of at least 5 years from the time of diagnosis. A sample of 600 eligible survivors and 200 nearest age siblings (comparison group) will be recruited from three regional hospitals in Hong Kong. A telephone survey was adopted to study the health status and HRQOL among childhood cancer survivors and their siblings using SF-36 questonnire (HRQOL) and the Baseline Questionnaire developed by the Childhood Cancer Survivor Study (CCSS) of University of Minnesota.

Results: Preliminary data on 344 survivors and 100 siblings were analysed using descriptive statistics, t-tests, and chi-square tests. The majority of subjects were male (60%) and under 21 years-old (48%) with a mean age of 21.7 (SD: 5.45). 46% of them had leukaemia and about 10% of all subjects suffered from a relapse of cancer. Results of the SF36 shows that average HRQOL was good (62/100 to 93/100), with the highest mean score reported for the physical functioning scale (m=93, SD=13.4). Younger subjects (age <21) appeared to have better general health perception (p<.05) and higher vitality (p<.05). About 60% of survivors had regular physical and dental check-ups. Only 24 % had medical insurance and 21% had life insurance. Their role physical scale (p<.01) and role emotional scale (p<.001) were higher than those without insurance coverage. Subjects who had poorer self-perception of health (p<.01) had lower scores in all subscales of SF36 (HRQOL). When compared with their siblings, survivors were significantly younger, had significantly lower educational levels (even after adjusting for age) and were significantly less likely to be married/live-in, have had a job before or have health insurance. After controlling for age/gender the difference in married/live-in was close to significance (p=.088), with an odds ratio (OR)=2.08, the difference

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in having ever had a job was also close to significance (p=.062, OR=1.82), while the difference in having health insurance was very significant (p< .0005, OR=3.65). Sibling controls had significantly better SF36 physical functioning (p<.0005, Mann-Whitney) after adjusting for age and gender. However survivors had better mental health scores (p=.039) and lower anxiety scores (p=.027) and these differences were also significant after adjustment.

Conclusions: Childhood cancer survivors in Hong Kong had satisfactory HRQOL and active health seeking behaviours. However, those who had poor self-perception of health, older in age, and without medical and life insurace coverage were at risk of poorer HRQOL. In addition, survivors had poorer socio-economic status and poorer physical functioning than their siblings. The better mental health score and less anxiety scores among survivors might attributed to denial or enhanced appreciation of life after the cancer diagnosis.

Implications: At present, programmes and community resources to assist adult survivors of childhood cancer are rare and need to be developed. Access to appropriate screening and counselling of these high risk persons at an earlier age may mitigate their risks and reduce cost to the individuals and to the health care system in the long run.

Ab70
Integrated human papillomavirus analysis as adjunct for triage of atypical cervical cytology

AN Cheung[1], OG Wong[1], KY Chan[1], MS Yang[2], CH Tsang[2], SL Ji[2], CK Lo[1], E Szeto[1], E Wong[1], HY Ngan[3]
[1]Department of Pathology, QMH, HKU
[2]Department of Biology and Chemistry, CityU
[3]Department of Obstetrics and Gynaecology, QMH, HKU

Background: Cervical cancer can be prevented by cervical cytology screening which can detect the cancer cells and its precursors. The most common abnormal cytological finding encountered in screening programmes is "atypical squamous cells of undetermined significance (ASC-US)". High risk HPV cocktail test is used for triage management of ASC-US but only a portion of high risk HPV positive ASC-US will progress to serious cervical lesions.

Aims: This study aimed at investigating whether one-stop integrated HPV molecular analysis can facilitate efficient triage of women with equivocal cytology diagnoses and enhancing understanding of HPV genotypes and transcription in relation to telomerase activity in the development of cervical cancer.

Methods: In a screening population of Hong Kong, 604 Hybrid Capture II (HC2) test positive ASC-US was retrieved. HPV genotyping was evaluated by a locally developed SNIPER HPV Genotyping Biochip Assay which adopts a PCR-based HPV DNA chip approach. Transcription profiles of HPV type specific E6/E7 and telomerase catalytic protein subunit (hTERT) was assessed by nested PCR and real time PCR. For hTERT study, 20 normal cytology samples, 7 squamous cell carcinomas (SCC), 20 low grade (LSIL) and 15 high grade squamous intraepithelial lesions (HSIL) were included. The correlation between the levels of type specific HPV E6/E7 transcription and hTERT transcription was also evaluated.

Results: The five most common high risk HPV genotypes detected were HPV52 (21.05%), HPV16 (15.51%), HPV58 (15.24%), HPV39 (7.62%) and HPV18 (7.2%). HPV 33 (p=0.001), HPV 58 (p=0.024) and HPV 68 (p=0.009) correlated with subsequent development of HSIL or above. HPV 58 (p= 0.023) and HPV 59 RNA (p= 0.026) transcripts were found to correlate significantly with subsequent detection of LSIL or above. A significant increase in hTERT RNA level was demonstrated among normal, ASC-US, LSIL, HSIL and SCC (p=0.0014, test for linear trend). High hTERT level in ASC-US positive for HPV 33 (p=0.031), HPV 39 (p=0.045) and HPV 58 (p=0.011) was significantly associated with development of HSIL or above. HPV genotyping, HPV E6/E7 and hTERT transcription improved the specificity and positive predictive values of HC2 test. There was also a significant correlation between hTERT level and E6/E7 transcription of HPV 16, 18, 52, 58 and 33 (p<0.05).

Conclusions: HPV genotyping, transcription assay of HPV E6/E7 and hTERT can enhance efficient triage of women with equivocal cytology diagnoses. Specific HPV genotypes and their transcription in relation to telomerase activity are likely to be important in cervical carcinogenesis.

Implications: Prophylactic HPV vaccines, besides protecting against cervical cancer can also reduce the burden of ASC-US in a screening population. The identification of HPV 58 and evaluation of HPV 58 transcript was promising in highlighting ASC-US cases with real risk of developing cervical cancer precursors in our population.

Ab152
Gene amplification of oncostatin M receptor (OSMR) in progression of cervical cancers and precancerous lesions: a liquid based cytology study

VCY Mak[1], OGW Wong[1], ESY Wong[1], OKL Tsun[1], E Szeto[1], KF Tam[2], HYS Ngan[2], ANY Cheung[1]
[1]Department of Pathology, HKU
[2]Department of Obstetrics and Gynaecology, QMH, HKU

Background: While human papillomavirus is the most important risk factor for cervical cancer, the development of squamous cell carcinoma (SCC) from its precursor squamous intraepithelial lesions (SILs) involves a long latent period with accumulation of multiple genetic alterations. Our earlier comparative genomic hybridisation study has demonstrated frequent gain in short arm of chromosome 5 (5p) in cervical cancers. Over-expression of oncostatin M receptor (OSMR) at chromosome 5p13.1 has been reported in human malignancies with activation of the JAK/STAT and MAPK signal transduction cascades.

Aims: This study evaluated the amplification status of OSMR in cervical cancers and precursors as attempt to understand its role in cervical carcinogenesis and to explore its potential as a possible adjunct for cytological detection of cancer and precursor cells.

Methods: OSMR amplification status was examined by chromosome in situ hybridisation (CISH) in 490 liquid based cytology samples diagnosed as normal, atypical squamous cells of undetermined significance (ASC-US), low grade (LSIL) and high grade SIL (HSIL) as well as SCC. Quantitative real time polymerase chain reaction (qPCR) was also performed in another 170 samples. Non-amplifying region MAN2A at chromosome 5 was used as control.

Results: By both CISH and qPCR, OSMR gene amplification was observed in a step-wise manner from pre-cancerous lesions to invasive SCC. Significantly higher OSMR gene copy numbers were found in HSIL or SCC compared with ASC-US and LSIL (P<0.01). There was no significant difference between normal and ASC-US and between HSIL and SCC (P>0.05). Among ASC-US, OSMR gene amplification did not correlate with subsequent development of HSIL or SCC (P> 0.05).

Conclusions: This is the first study demonstrating OSMR gene amplification at chromosome 5p in liquid-based cervical cytology by qPCR and CISH analyses. Such findings support the role of OSMR activation in cervical carcinogenesis and its potential value as a molecular marker in cervical cancer detection.

Ab169
Fine mapping candidate loci for nasopharyngeal carcinoma (NPC) in southern Chinese specifically linked to EBV aetiopathogenesis

Y Li1*, L Fu2*, AMG Wong[2], YH Fan[1], MX Li[1], JX Bei[3], WH Jia[3], YX Zeng[3], D Chan[1,6], KMC Cheung[4], P Sham[5,6], D Chua[2], XY Guan[2], YQ Song[1,6]
[1]Department of Biochemistry, HKU
[2]Department of Clinical Oncology, HKU
[3]State Key Lab of Oncology in Southern China & Department of Experimental Research, Sun Yat-sen University Cancer Centre, Guangzhou, China.
[4]Department of Orthopaedics and Traumatology, HKU
[5]Department of Psychiatry, HKU
[6]Centre for Reproduction, Development and Growth, HKU
*YL and LF contributed equally to this work

Nasopharyngeal carcinoma (NPC) is a malignancy that has nearly 100-fold higher incidence in southern Chinese than in most European populations. NPC clusters in families, which suggests that both

geography and genetics may influence disease risk. The age group is younger than most adult cancer patients. A population study (Huang et al., 2002) has reported that the risk of suffering from NPC is 9.31 times higher in the first-degree relatives of patient with NPC than in the first-degree relatives of spouse. The heritability is 68.08%. We employed case-control analysis to study the association of chromosome 6p regions with nasopharyngeal carcinoma. Total 360 subjects and 360 healthy controls were included. Significant associations were found for multiple markers (most significant p= 3.36E-05, rs2076483) and genes (*GABBR1, HLA-A and HCG9*). Further investigation of the allele frequencies between cases and controls suggested regions of micro-deletion within *GABBR1* and *NEDD9*. Real-time PCR using 11 pairs of NPC biopsy samples confirmed significant decrease in the cancer tissues (p=0.059 and 0.015 respectively). Our study from both genetics and functional points of view demonstrated chromosome 6p multiple regions contribute to risk of nasopharyngeal carcinoma.

Ref. No. RFCID: 08070652

Ab170
6p candidate genes associated with nasopharyngeal carcinoma

Y Li[1]*, L Fu[2]*, AMG Wong[2], YH Fan[1], MX Li[1], JX Bei[3], WH Jia[3], YX Zeng[3], D Chan[1,6], KMC Cheung[4], P Sham[5,6], D Chua[2], XY Guan[2], YQ Song[1,6]

[1]Department of Biochemistry, HKU
[2]Department of Clinical Oncology, HKU
[3]State Key Lab of Oncology in Southern China and Department of Experimental Research, Sun Yat-sen University Cancer Centre, Guangzhou, China.
[4]Department of Orthopaedics and Traumatology, HKU
[5]Department of Psychiatry, HKU
[6]Centre for Reproduction, Development and Growth, HKU
*YL and LF contributed equally to this work

Aims: We employed case-control analysis to study the association of Chromosome 6p regions with nasopharyngeal carcinoma.

Methods: A total of 360 subjects and 360 healthy controls were included and 233 single nucleotide polymorphisms on 6p were examined.

Results: Significant associations were found for multiple markers (most significant p= 3.36E-05, rs2076483) and genes (*GABBR1, HLA-A and HCG9*). Further investigation of the homozygous genotype frequencies between cases and controls suggested micro-deletion regions which affecting *GABBR1* and *NEDD9*. Real-time PCR using 11 pairs of nasopharyngeal carcinoma biopsy samples and corresponding non-tumourous samples confirmed significant decreases in the cancer tissues.

Conclusions: Our study from both genetics and functional points of view demonstrated that Chromosome 6p susceptibility loci contribute to risk of nasopharyngeal carcinoma.

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Ab176
Modelling the potential impact of HPV vaccination on Hong Kong's cervical cancer burden

JT Wu, CW Choi
School of Public Health, HKU

Background: Cervical cancer is one of the most common cancers among women in Hong Kong. There are around 400 new cases annually and it ranked 5th and 7th among all new cancer cases in 2006 and 2007, respectively. Infection of human papillomavirus (HPV) at the cervix is the cause of cervical cancer. Cervical cancer is preventable by cervical screening which aims at early detection or by vaccination which prevents HPV infection. Vaccines targeting against the two most prevalent HPV types (16 and 18) have recently been developed and are now commercially available in Hong Kong.

Methods: We built a mathematical model to perform a cost-effectiveness analysis (CEA) on the public health impact of HPV vaccination. We developed a dynamic transmission model to estimate

the herd effect of large-scale HPV vaccination and also constructed an individual-based stochastic model to simulate the effect of HPV vaccination in combination with the current screening pattern. We also conducted questionnaire surveys on adolescent girls and women who had daughter under 18 to investigate their knowledge on HPV and cervical caner and their tendency to vaccinate.

Results: In the surveys, we successfully interviewed 2,254 adolescent girls and 1,023 mothers who had daughters under 18. Thirty-three percent of adolescent girls and 45% of women would consider vaccinating themselves and their daughters respectively. Age of vaccination was a main factor that influences the willingness to vaccinate. Both adolescents and mothers expressed that the suitable age of vaccination was 15-16 years-old, which was older than the vaccination age recommended by the vaccine manufacturers (9-12 years-old). In the CEA, we applied the post-vaccination HPV infection rates estimated from the dynamic transmission model to an individual-based cohort model to simulate the long-term impact on prevention of cervical cancer. Compared with the current cervical screening scheme ("1-1-3 screening cycle"), vaccinating girls at age 16 with 40% coverage results in cost-effectiveness ratios of USD150,000, 94,000 and 77,000 per life-years when vaccination is implemented for 20, 40 and 60 years, respectively.

Conclusions: Our results suggested that implementing a long-term HPV vaccination programme in addition to current screening practice would be cost-effective in reducing the burden of cervical cancer in Hong Kong. Besides the age of vaccination, results from survey reported that knowledge on HPV and cervical cancer also drives the tendency to vaccinate. This suggested that to increase vaccination coverage, relevant knowledge should also be provided to the public so that they realise the purpose and the need of vaccination.

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Ab177
Cervical cancer prevention through cytologic and HPV DNA screening in Hong Kong Chinese women

JT Wu, CW Choi
School of Public Health, HKU

Background: Cervical cancer is a common female-specific cancer in Hong Kong. Among all cancers, its incidence ranked 5th and 7th in 2006 and 2007, respectively. The cancer, however, is preventable by early detecting intermediate pre-cancer lesions before they progressing to invasive carcinoma. In 2004, the Department of Health (DH) launched the Cervical Screening Programme (CSP), aiming at increasing the overall screen coverage to reduce the disease burden of cervical cancer. The DH also introduced the "1-1-3 screening cycle" for target population (women aged 25-64) that they should screen annually and then can screen 3-yearly after obtained normal results for two consecutive years. In 2008, The Hong Kong College of Obstetricians and Gynaecologists (HKCOG) released the latest Guidelines on managing abnormal cervical cytology (the HKCOG Guidelines) and suggested the possibility of using HPV DNA testing as triage.

Methods: To assess the impact of CSP, we conducted questionnaire survey on women aged 25-64 to evaluate their screening behaviour and compared the results to similar data from 2003. To perform cost-effectiveness analysis (CEA) on cervical cancer screening, we developed an individual-based stochastic model which simulated the natural history under various screening scenarios. To further evaluate the role of HPV DNA testing in cervical cancer screening in Hong Kong, HPV DNA test is added to the simulation model as part of the screening programmes. Our assumptions regarding management of abnormal screening results were based on the HKCOG Guidelines.

Results: In the survey, we successfully interviewed 1,023 respondents. The ever screened rate rose from 35% to 64% before and after the launch of CSP. Assuming 60% screen coverage, we found that the strategy of adding HPV DNA testing as triage in the "1-1-3 screening cycle", though resulted in more life-years saved (LYS), was dominated by cytology-only screening strategies. In terms of the threshold of incremental cost-effectiveness ratio (ICER) suggested by the WHO, the 4-yearly cytology-only screening strategy was the best screening strategy while the 3-yearly cytology-only strategy was marginally cost-effective, with an ICER of US$44898 and 97913 per LYS respectively.

Conclusions: Our survey results suggested that screen coverage has increased since the launch of CSP. From CEA, our results suggested that routine screening interval greatly affects the cost-effectiveness of screening prevention and the routine screening interval of "1-1-3 screening cycle" could be prolonged when adding HPV DNA testing as triage which gives similar LYS. This highlighted the importance for the target population to register with CSP which can automatically remind women when their next screening for cervical cancer is due.

Ref. No. SHS-P-08

Ab209
Mammography screening for breast cancer in Hong Kong: a cost-effectiveness analysis

IOL Wong[1], KM Kuntz[2], BJ Cowling[1], CLK Lam[3], GM Leung[1]
[1]School of Public Health, HKU
[2]Division of Health Policy and Management, School of Public Health, The University of Minnesota & Department of Health Policy and Management, Harvard School of Public Health, USA
[3]Family Medicine Unit, HKU

Aims: To estimate the cost-effectiveness of biennial mammography screening in a population of Hong Kong Chinese women, and to inform public health polices in Hong Kong and East Asia with lower breast cancer incidence compared with western countries but increased concern about the cost of health care.

Methods: We developed a state-transition decision model to simulate mammography screening, breast cancer diagnosis and treatment in a hypothetical cohort of Hong Kong Chinese women. We derived model inputs from local clinical, epidemiological and economic data, and from a literature review. We modelled the benefit of mammography by assuming a stage shift (i.e., cancers in screened women were more likely to be diagnosed at an earlier stage), estimated via model calibrations with trial results. We compared quality-adjusted life years saved (QALY) and costs for five strategies: four biennial 2-view mammography strategies, beginning at age 40 or 50 and ending at age 69 or 79, and a no screening scenario.

Results: Biennial mammography screening resulted in a gain in life expectancy ranging from 4.3 to 9.3 days compared with no screening at an incremental cost of US$1,170 to 2,420 per woman screened. The least costly non-dominated screening option was screening women from 40 to 69 years of age, with an incremental cost-effectiveness ratio (ICER) of US$62,700 per QALY compared with no screening. In probabilistic sensitivity analyses, the probability of the ICER being below a threshold of US$50,000 per QALY was 15.4%. Extending the screening programme to age 79 (the next most effective strategy) would cost an additional US$182,000 per QALY.

Conclusions: Mass mammography screening may not currently cost-effective in Hong Kong, according to international standards where the threshold is around US$50,000 per QALY. Thus, mass mammography for Chinese women in Asia would likely be an inefficient use of scarce public health dollars currently. However, we must remain vigilant and periodically revisit the question of population screening as the breast cancer incidence in Hong Kong is increasing and benefit of mass screening would be increased.

Ref. No. HHSRF: 03040751

Ab233
Psychosocial and physical outcomes after surgery breast cancer: a five- to six-year follow-up

WWT Lam[1], YT Shing[1], M Chan[2], A Or[2], R Fielding[1]
[1]School of Public Health, HKU
[2]Department of Surgery, KWH

Background: Early detection and treatment advances have improved prognosis and enhanced long-term survival for women diagnosed with early-stage breast cancer (ESBC). While psychological distress arising from diagnosis and treatment largely resolves during the year after diagnosis of ESBC, recent evidence suggests that there are at least four distinct trajectories of change in psychological outcome following the diagnosis of breast cancer: namely chronic distress (stable high levels of distress), recovered (starting with initial distress that gradually resolves), delayed-recovery (delayed distress that subsequently resolves), and resilience (stable low levels of distress) (Lam et al, 2009). Our previous study (Lam et al, in press) showed one in seven women

experienced chronic distress resulting from the diagnosis of ESBC, but little is known on how chronic distress at the acute phase of illness trajectories impacts long-term psychosocial adjustment.

Aims: We therefore examined the effect of distress patterns over the first year following ESBC diagnosis on psychosocial outcomes at 6 years after the initial diagnosis.

Methods: 285/303 Chinese women recruited one-week post-surgery for ESBC were assessed for psychological distress with the Chinese Health Questionnaire (CHQ12) at 1, 4, and 8 months later. Latent growth mixture modelling revealed four distinct distress trajectories during the 8-nonths following surgery. 186/285 women were reassessed 6 years later comparing scores on the Hospital Anxiety and Depression Scale (HADS), Impact of Event Scale (IES), Chinese Social Adjustment Scale (ChSAS), and Life Orientation Test (Ch-LOT-R) by 8-month distress trajectory.

Results: Distress trajectories over the first 8-months post-surgery significant predicted 6-years psychosocial outcomes. Women in the resilient group had the best 6-year psychosocial outcomes. Women with chronic distress had significantly greater psychological distress, cancer-related distress, and poorer social adjustment in comparison to women in the resilient group. Women in the recovered or delayed-recovery groups did equally well on most of the psychosocial outcomes compared to those in the resilience group, except for perceived decrements in body image and sexuality. Predictors of distress group membership included treatment decision-making difficulties (TDMD) and residual symptoms. TDMD is linked to initial diagnostic consultation participation (Lam et al, 2003).

Conclusion: Women with chronic distress following ESBC persisted in showing the worse longer-term psychosocial outcomes. Chronic distress was associated with poor TDM, symptom distress and disappointment with surgical outcome. Differentiating women at risk from chronic distress groups is required to optimally target suitable interventions and resources. Both self-image and sexuality remained below pre-diagnosis level, suggesting prolonged impacts of breast cancer on both private and public social selves. Interventions that facilitate women's coping with changes in body image and sexuality should be incorporated into the post-operative rehabilitation services.

Ref. No. HHSRF: 05060581

Ab140
Predictors of cardiovascular and cancer outcomes in a population-based 13-year prospective study in Hong Kong

AWK Tso[1,2], BMY Cheung[1,2], TH Lam[3], SV Lo[4], LSC Law[1], KSL Lam[1,2]
[1]Department of Medicine, HKU
[2]Research Centre of Heart, Brain, Hormone and Healthy Aging, HKU
[3]School of Public Health, HKU
[4]Strategy and Planning Division, HA

Background: Obesity is becoming increasingly prevalent in our population. Obesity has been reported to be associated with cardiovascular diseases (CVD) and some forms of cancer in the Western world. As CVD and cancer are the two leading causes of death in Hong Kong, it is of much importance to investigate whether obesity and its related factors contribute to the development of these diseases in our population.

Methods: Subjects were recruited from the Hong Kong Cardiovascular Risk Factor Prevalence Study (CRISPS), a population-based prospective study commenced in 1995-6 to assess the prevalence and development of diabetes CVD risk factors in our population. Subjects were last reassessed in 2005-8 at a median of 12.9 years (CRISPS-3). CVD and cancer outcomes were confirmed at the Hospital Authority Computer database using physician-entered diagnosis codes. CVD was defined as diagnosis, admissions or mortality due to chronic stable angina, unstable angina, heart failure requiring hospitalisation, acute myocardial infarction, coronary artery disease requiring intervention, transient ischaemic attack, stroke, peripheral vascular disease requiring angioplasty, bypass surgery or amputation. Cancer includes all cancers.

Results: A total of 2091 subjects had full anthropometric and biochemical data from CRISPS-1 and outcome data. Of these, 113 subjects has confirmed incident CVD. In addition to male sex and age, baseline body mass index or waist circumference (WC), fasting glucose, 2-hour glucose after oral glucose tolerance test, insulin resistance index HOMA-IR, systolic and diastolic blood pressure, triglycerides, high-density lipoprotein, the presence of diabetes, hypertension, dyslipidaemia and the metabolic syndrome were all predictive of incident CVD over 12.9 years even after controlling for age (all $p<0.01$). On multivariate analysis, baseline age, WC, HOMA-IR, the presence of hypertension and diabetes were independently risk factors for incident CVD. 176 subjects had incident cancer over 12.9 years. Age and female sex were significantly associated with cancer. In addition, baseline high density lipoprotein, HOMA-IR and the presence of diabetes were significantly associated with cancer development after adjustment of age. On multivariate analysis, age, female sex, low HDL and diabetes were the independent risk factors for the development of cancer.

Conclusions: Diabetes mellitus appears to play an important pathophysiological role in the development of CVD and cancer in our population. Weight reduction and regular aerobic exercise are lifestyle measures that may prevent or delay diabetes development. Community-wide education and primary care health policies should focus on these preventative strategies, aiming to reduce insulin resistance state and diabetes development and hence future CVD and cancer events.

Ab171
Can we predict postoperative cardiac complication with endothelial function test?

M Chan, E Koo, L Chu, T Gin
Department of Anaesthesia and Intensive Care, PWH, CUHK

Background: Endothelial dysfunction is known to be associated with adverse cardiac events, such as myocardial infarction, arrhythmia, heart failure, stroke, thromboembolism and cardiac death in the general population. We tested whether endothelial dysfunction as detected by non-invasive peripheral arterial tonometry can predict major cardiac complications after major non-cardiac surgery.

Methods: The study was approved by the Clinical Research Ethics Committee. 169 patients undergoing major non-cardiac surgery gave written informed consents. On the day before surgery, reactive hyperaemia was induced following upper arm occlusion of systolic blood pressure using an Endo-PAT device (Itamar Medical, Caesarea, Israel). Reactive hyperaemia index (RHI) was calculated from the ratio between the digital pulse volume during reactive hyperaemia and at baseline. Patients were assessed by a blinded observer for major cardiac complications up to 30 days after surgery.

Results: During 30 days follow-up, 19 patients (11.7%) had major cardiac complications (myocardial infarction 18, stroke 1, pulmonary embolism 1, atrial fibrillation 3). The mean (±standard deviation) RHI in patients with cardiac complications (1.23±0.16) was lower than those without (1.63±0.35), $P<0.001$. RHI predicted postoperative cardiac complications with a sensitivity and specificity of 80% and 72%, respectively, area under the ROC curve was 0.87. Patients with impaired RHI value (<1.41) had a higher risk of developing post-operative cardiac complications, hazard ratio (95% confidence intervals): 5.3 (1.9-14.8).

Conclusions: A low RHI, detected by non-invasive peripheral arterial tonometry was associated with higher cardiac complications after major non-cardiac surgery. Assessment of peripheral vascular function in addition to the clinical risk score is useful in identifying high risk patients requiring peri-operative interventions and monitoring.

Cardio

Ab262
A prospective investigation of the prognostic value of 'TIMI' and 'front door TIMI' in Chinese patients presenting to the emergency department with undifferentiated chest pain

CA Graham, JWM Chan, PSK Mak, TH Rainer
Accident & Emergency Medicine Academic Unit, CUHK

Background: Chest pain is a common complaint among emergency department (ED) patients. The Thrombolysis in Myocardial Infarction (TIMI) risk score and front door Thrombolysis in Myocardial Infarction (FDTIMI) risk score have been proven to be useful to risk stratify chest pain patients in many Western countries, but it has not been validated in Asian countries.

Aims: The aim of this study was to establish the relationship between TIMI and FDTIMI and the 30 day rate of major adverse cardiac outcomes (MACE) of patients with chest pain.

Methods: We conducted a prospective observational cohort study of consecutive ED patients presenting with chest pain enrolled from July 2009 until March 2010. Data collected included patient characteristics, TIMI items and past medical and medication history. The primary outcome was MACE within 30 days of ED presentation. MACE was defined as a composite outcome which is fulfilled if any of the following occurs: death (all causes), readmission with myocardial infarction (MI), acute coronary syndrome (ACS) not diagnosed at initial ED presentation and percutaneous coronary intervention.

Results: 1000 patients were recruited and 30-day follow-up was completed on all patients. Patients had a mean age of 66.7 ± 14 years and 54% were male. 169 (17%) patients had a MACE within 30 days of ED presentation. The incidence of MACE in each TIMI group is as follows: TIMI 0, 1/145, (0.7%); TIMI 1, 21/249 (8.4%); TIMI 2, 44/239, (18.4%); TIMI 3, 40/179, (22.3%); TIMI 4, 42/122, (34.4%), TIMI 5, 14/52, (26.9%), TIMI 6/7, 7/14, (50%). There was an excellent correlation between TIMI and MACE ($p=0.964$, $p<0.001$). Increasing FDTIMI was also associated with increased risk of MACE within 30 days ($p= 1$, $p=0.01$).

Conclusions: The TIMI and FDTIMI risk scores are useful tools for risk stratification of ED patients with undifferentiated chest pain. However, patients in the low risk group still had a risk of having MACE (0.7% for TIMI 0 and 1.3% for FDTIMI 0). Therefore, while the scores can patients at high risk of MACE, they cannot be used to identify patients suitable for early discharge.

Cardio

Ab35
A study investigating factors that affect long-term care use in Hong Kong

WQV Lou[1], WTE Chui[1], YMA Leung[2], KL Tang[3], I Chi[4], KSE Leung[1], CW Kwan[5]
[1]Sau Po Centre on Ageing, HKU
[2]Department of Nursing Studies, HKU
[3]School of Social Work, The University of British Columbia, Canada
[4]School of Social Work and School of Gerontology, University of Southern California, USA
[5]Department of Statistics and Actuarial Science, HKU

Aims: This study aims to study factors affecting long-term care (LTC) utilisation in Hong Kong. Adopting the revised Anderson model of health service utilisation, needs factors, enabling factors and psychological factors were the focus of the study.

Methods: A multi-stage cluster sampling method was adopted, in which 435 dyads (frail older adult and his/her family caregivers) were recruited from 59 service units from 8 randomly selected geographic constituency areas. Standardised questionnaires were administered by a trained research assistant.

Results: The relationship between psychological factors and LTC use outweighed factors traditionally discussed in the literature (i.e., predisposing, needs, and enabling factors). Older people who held a positive attitude towards community care services (CCS), a preference for being cared for by CCS and family structural solidarity play the most important role in LTC use in Hong Kong. Other than the above, CCS receipts tended to have a lower degree of cognitive impairment, greater likelihood to have smaller social support networks, greater likelihood to receive an Old Age Allowance (OAA) or Disability Allowance (DA).

Conclusions and implications: First, while the study revealed that positive attitude towards CCS is associated positively with using CCS, the knowledge base about CCS was found to be very limited. Hence, awareness and accessibility of CCS is recommended to be strengthened. Establishing resource centres for families for LTC decision-making was suggested. Second, this study reveals that family structural solidarity tends to confine itself to nuclear families rather than inter-generational families, which implied that spouse and adult-children caregivers have differentiated needs. Hence, caregiver support services targeting the elderly couples' families and children as caregivers are recommended to be differentiated and targeted. Third, although CCS receipts were less cognitively impaired than residential care receipts, their level of cognition was not high. Plus, the average duration of instrumental activities of daily living dependency was as long as 37 months. In view of this, we recommend the government consider providing targeted support to those taking care of cognitively impaired and IADL-disabled elderly people in the community. Literature suggested some evidence-based caregivers' interventions that are effective to relieve the care giving burden, such as psycho-education, individual counselling, and respite services. Last but not least, there is always the wisdom that "prevention is better than the cure." It would, therefore, be necessary for the government to promote healthy ageing and proactive LTC planning amongst the elderly people and their families in general, and elderly couples in particular, before LTC needs emerge through community elder centres.

Ab109
Influenza-like illness in residential care homes: a study of the incidence, aetiological agents, natural history, and health resource utilisation

J Woo[1], E Hui[2], PKS Chan[3], M Ip[3], DSC Hui[1]
[1]Department of Medicine and Therapeutics, CUHK
[2]Department of Medicine and Geriatrics, Shatin Hospital
[3]Department of Microbiology, CUHK

Background: Influenza-like illness (ILI) among elderly living in residential care homes (RCHE) is a common cause for hospitalisation. We examined the incidence, underlying aetiology, natural history and associated healthcare resource utilisation related to ILI in the RCHE population.

Methods: A prospective study of ILI in 4 RCHEs in Shatin, HK, from April 2006 to March 2007 was conducted. Each RCHE was monitored daily for ILI occurrence, and followed up until resolution of illness or death. Clinical features were recorded whereas sputum, nasopharyngeal aspirate, blood, and urine specimens were examined for underlying aetiology.

Results: 259 episodes of ILI occurred in 194 subjects, with mild peaks in winter and summer, over a sustained level throughout the year. Infection agent was identified in 61.4% of all episodes, comprising bacterial infection in 53.3% and viral in 46.7%. Multiple infections occurred in 16.2% of subjects. The most frequent organisms were Streptococcus pneumoniae, followed by respiratory syncytial virus, *Pseudomonas aeruginosa*, metapneumovirus and parainfluenza viruses type 1 & 3. Clinical features did not vary according to underlying aetiology, the common presenting features being "decrease in general condition", cognitive and functional deterioration, and withholding of food in addition to fever and respiratory symptoms. Overall, mortality at 1 month/discharge was 9.7%. MRSA infection, low BMI, and poor function predisposed to mortality. No association between influenza vaccination status and underlying aetiology, clinical features or outcome, was observed.

Conclusions: ILI represents a considerable burden of disease in RCHE, with 87% giving rise to hospital admissions. Clinical presentation of ILI in the elderly is non-specific and does not correspond to underlying aetiological agents. A large percentage of ILI is due to bacterial and other viral infections than influenza in the RCHE population.

Implications: The current policy of influenza A vaccination in late Autumn seems appropriate, and the introduction of pneumococcal vaccination in elderly subjects aged ≥65 years may reduce further the rates and hospitalisation of these ILI infections.

Ab132
A randomised controlled trial on an innovative and integrative community health care model to improve the health of high-risk elders in the community: the HARRPE Project

J Ho, P Kwong, S Chan, B Kong, CP Wong, L Yam
Hong Kong East Cluster, HA

Background: To improve the care of "high-risk" elders (defined by proneness to recurrent admissions) and reduce utilisation of healthcare resources post-discharge, the Hong Kong East Cluster (HKEC) launched a 2-year pilot project by assigning nurses to proactively conduct phone contacts to these patients to deliver appropriate health advice and/or early intervention in accordance with information in their electronic patient records [the "Telephone Nursing Consultation Service" (TNCS)]. A computerised risk prediction score, the "Hospital Admission Risk Reduction Programme for the Elderly" (HARRPE) score developed in the Hospital Authority (HA) was utilised to identify high risk elderly clients.

Aims: To study the effectiveness of the HARRPE project in identifying and empowering high-risk elderly clients and care-givers post-discharge, coordinating their care, improving their health in the community and reducing unnecessary acute hospital admissions.

Methods: Subjects with HARRPE score >0.17 (>17% risk of unplanned readmission within 28 days post-discharge), were identified and randomised into Control (conventional ambulatory follow-up, CG) or Treatment Group (TG) TG received additional telephone follow-up within 48 hours of discharge by TNCS nurses to assess, refer and coordinate relevant healthcare stakeholders. Outcomes: Differences in service utilisation rates between TG and CG when comparing the within-Group 90-days pre- and post-index admission episodes.

Results: From 26 Jul to 14 Sept 2007, 475 patients were recruited (249 assigned to TG, 226 to CG, no significant differences in baseline data). Compared to CG, TG had reduction in hospital utilisation by 37% AED attendance, 60% in AED admission, 48% in non-AED admission, 26% in acute bed days and 9% in non-acute bed days. The findings were confirmed in another study with the same methodology conducted in 26 Jul -14 Sept 2008.

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Conclusions: The "Hospital Admission Risk Reduction Programme for the Elderly" was successful in identifying high-risk elderly clients, and, with post-discharge care delivered in the context of the Telephone Nursing Consultation Service, could empower them towards self-management at home, co-ordinate relevant hospital and community healthcare stakeholders, improve the health of clients in the community and reduce unnecessary acute hospital admissions. This innovative and integrative model was adopted by HA in April 2009 in the HA community Call Centre for extension to all hospital clusters.

Ab203
A prospective study on the association between lower urinary tract symptoms and erectile dysfunction: results from a large study in elderly Chinese men in Southern China

SYS Wong[1], JCS Leung[2], J Woo[2,3]
[1]School of Public Health and Primary Care, CUHK
[2]Jockey Club Centre for Osteoporosis Care and Control, CUHK
[3]Department of Medicine and Therapeutics, CUHK

Background: Although many cross-sectional studies have been conducted on the association between lower urinary tract symptoms (LUTS) and erectile dysfucntion (ED), no studies were prospective in Asia.

Aims: The relationship between LUTS and ED is examined using a prospective cohort of 2000 Chinese men.

Methods: Baseline and 4-year data from a large prospective cohort study of 2000 Chinese elderly men were analysed. 1736 subjects were included in the current analysis after excluding those with history of bladder or prostate cancer, or urological surgery, and those who used alpha blockers or anti-androgen. LUTS were measured at baseline by the International Prostatic Symptom Score (I-PSS) and ED was measured using one question on impotence at the end of 4 years.

Results: A dose-response relationship was observed for the relationship between baseline severity of LUTS and severity of ED at follow up with those who had more severe LUTS at baseline having an increased odds of having more severe erectile dysfunction (OR=1.86, CI: 1.16-2.97 for mild LUTS at baseline; OR=2.95, CI: 1.81-4.81 for moderate LUTS at baseline; and OR=3.82, CI: 2.00-7.27 for severe LUTS at baseline). Other baseline factors that were statistically significantly associated with ED included body mass index (OR=1.13, CI: 1.01-1.26), hypertension (OR=1.30, CI: 1.02-1.65) and diabetes (OR=1.44, CI: 1.07-1.93).

Conclusions: The presence of LUTS is associated with ED with more severe LUTS being associated with higher degree of ED in men.

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Ab276
Advance directive and the preference of old age home residents for community model of end-of-life care in Hong Kong

LLW Chu[1], JKH Luk, J Woo, E Hui, P Chiu, T Kwok, D Lee, SM McGhee
[1]Division of Geriatrics, QMH, HKU

Background: There is limited local data on the attitudes towards and preferences for advance directive, end-of-life care decisions and community end-of-life care options among Chinese elderly people. In Hong Kong, most elderly people would be admitted to the hospital before or during their end-of-life period. Some treatments and services might be provided in a non-hospital setting but we do not know the acceptability of changing the site of care or of the trade-offs that might be required. The objectives of the present study were:- 1) to describe the knowledge and preferences of Hong Kong Chinese elders regarding advanced directives and end-of-life care decisions; 2) to investigate the predictors of preference for advance directive and community end-of-life care; 3) to investigate the proportion of old age home residents who would accept community end-of-life care in the old age home rather than the hospital, and the trade-off that they were willing to make between attributes of care; 4) to evaluate the potential cost-savings of community end-of-life care models on the hospitalization bed-day costs related to end-of-life care.

Methods: 1600 cognitively normal elderly underwent face-to-face interviews in the old age homes, using a structured questionnaire. In addition, four hypothetical questions were asked to explore preferences for end-of-life care. Using a discrete choice approach, specific questions explored acceptable trade-offs between three attributes: availability of doctors on site, attitude of the care staff and additional cost of care per month.

Results: The mean age of the subjects was 82.4 years. 94.2% of the subjects would prefer to be informed of the diagnosis if they had terminal diseases. 88.0% agreed that it would be good to have an advance directive for them regarding medical treatment in the future. 59.1% wished to receive medical treatment in old age homes. Approx. 30% of respondents prefer end-of-life care in hospital, while 35% of respondents prefer the old age home and 23% of them would consider it in a better old age home. In logistic regression analyses of the preference of dying in their present old age homes, older age, having siblings in Hong Kong, Catholic religion and not receiving any government old age allowance independent predictors. A good attitude of staff was the most important attribute of the care site. Respondents were willing to pay an extra cost of HK$38 per month for more coverage of doctor's time and HK$376 for a better attitude of staff in the old age home. Respondents on Comprehensive Social Security Allowance Scheme valued the cost attribute more highly, as expected, validating the hypothesis that those respondents would be less willing to pay an additional cost for end-of-life care.

Conclusions: One-third of cognitive normal old age home elders accept dying in their old age homes. Gender, age, religion, painful symptoms and mood are independent predictors of these preferences. Use of community-based end-stage care would be possible in the future if better facilities and services were available. The most important attributes of the home to the residents was the attitude of care staff.

Ref. No. SHS-E-08

Elderly

Ab165
Evidence-based adjustment of topical glaucoma drop use among Hong Kong patients

C Leung[1], N Congdon[1], P Lam[1], H Fan[1], A Poon[1], M Boland[2], N Yuen[1], D Lam[1]
[1]Department of Ophthalmology and Visual Sciences, CUHK
[2]Wilmer Eye Institute, Johns Hopkins University, USA

Aims: To utilise recently-available data on glaucoma risk factors in order to identify patients with ocular hypertension in whom medical therapy can be reduced without significant risk of damage, thus reducing health costs and the risk to medical side effects.

Methods: This is a clinic-based prospective cohort study. Patients who can safely reduce glaucoma medications (no useful vision, or calculated risk of developing glaucoma is <2% per year based on measurement of cup-to-disc ratio (a measure of glaucoma damage to the optic nerve), intra-ocular pressure, central corneal thickness, and pattern standard deviation) were identified in clinics at Prince of Wales and Hong Kong Eye Hospitals. Then, based on these data, to estimate the potential savings to Hospital Authority through full-scale implementation of such a program. Impact of drop reduction on patient quality of life will also be studied.

Results: 1065 patient record were screened and examination of 71 subjects (recruitment and examination of patients is ongoing) showed that 5.7% of patients had successfully eliminate at least one medication. It was estimated that on average $407, 538 can be saved per year per 10,000 patients managed with ocular hypertension.

Conclusions: Implementing the evaluation of glaucoma risk factors in the decision making to initiate medical therapy is a cost-effective approach to manage glaucoma.

Ab168
Prevalence of refractive errors in children with special needs
SY Yu[1], HY Lam[1], CS Lam[1], MKH Yap[1,2]
[1]Centre for Myopia Research, School of Optometry, PolyU
[2]HKJC Sports Medicine & Health Sciences Centre, PolyU

Aims: To identify prevalence of refractive errors in children with special needs

Methods: Three hundred and thirty-four subjects aged between 6 and 19 years were screened in 3 special needs schools in Hong Kong from November 2006 to April 2010. Most subjects had mild to moderate degrees of Down's syndrome or autism. Presenting vision and visual acuity were assessed with the LEA symbol acuity chart. The "pass/fail" criterion was set at 6/12 Snellen equivalent. Refractive errors were assessed using auto-refraction, retinoscopy and/or subjective refraction.

Results: One hundred and forty-two subjects (~42%) failed the presenting vision test. One hundred and thirty-four subjects (40%) showed significant refractive errors. High myopia (greater than -6.00D) was present in 14 subjects (~4%). High hypermetropia (greater than 6.00D) was present in 2 subjects. Significant astigmatism (equal to or greater than 2.00D) was present in 72 subjects (~21%). One hundred and nineteen subjects (~35%) could have improved visual acuity with a new or updated optical correction.

Conclusions: Children with special needs may not be able to tell their care givers that they cannot see clearly. Consequently, their refractive errors remain undetected. Blurred vision from uncorrected refractive error may adversely affect a child's learning performance and socialisation, leading to behavioural and communication problems. This study confirms that in our local population of children with special needs, the prevalence of uncorrected refractive errors is high in relation to other children. In particular, the high prevalence of significant astigmatism requires special attention as early management of this condition is known to prevent amblyopia. Our findings highlight the need of providing systematic and comprehensive eye care services for this special group of children by relevant healthcare authorities.

Eye

Ab130

Elucidation of the role of cathelicidin in the control of *Helicobacter pylori* colonisation in the stomach and protection against *Helicobacter pylori*-induced gastritis

L Zhang, CCM Wong, J Yu, CH Cho
School of Biomedical Sciences and Department of Medicine and Therapeutics, CUHK

Helicobacter pylori (H. pylori) infection is one of the most prevalent infectious diseases, affecting more than 50% of the world's population. *H. pylori* infection causes chronic active gastritis and a considerable number of them eventually lead to the establishment of atrophic gastritis. Although there are antibiotics which are effective in eradicating the bacteria, the development of drug resistance is common and is also the major cause of treatment failure. A new form of drug therapy through different mechanisms of action is required to provide an alternative method for *H. pylori* eradication.

In this study we have successfully constructed a cathelicidin-secreting *Lactococcus lactis* (a probiotic) which was shown to survive and colonise the gastric epithelium in wild type and cathelicidin-knockout mice. *H. pylori* was also found to successfully colonise the gastric tissues in both types of animals as evidenced by urease test, PCR, faecal antigen assay and histologic assessment of bacterial colonisation. This bacterium infection induced marked gastric inflammation as shown by increases in inflammatory score and neutrophil infiltration three months after infection. Different inflammatory cytokines including TNF-α and IL-6 were markedly elevated. There was no significant difference in inflammatory responses in the stomach between the wild type and the cathelicidin-knockout mice, indicating that endogenous cathelicidin may not play an important role in the prevention of *H. pylori*-induced gastritis. However, treatment with cathelicidin-encoded *Lactococcus lactis* but not the probiotic alone for two months significantly reduced the gastric levels of both inflammatory cytokines examined in this study. There was a trend in the reduction of inflammatory score by this bioengineered preparation in both wild type and knockout mice. Also there was an indication that the level of *H. pylori* infection was also decreased. Moreover, this preparation did not affect the hepatic and renal functions in mice after two months of treatment. Taken together, it is likely that cathelicidin-encoded probiotic could be an effective and safe therapeutic agent for the treatment of *H. pylori*-induced gastritis. This could serve as an alternative therapy for *H. pylori* infected-patients who are intolerant and resistant to conventional antibiotic treatment.

Ab161

First-stage development of genome sequence database for the identification of food-borne pathogens in Hong Kong

HS Kwan[1], CH Au[1], PTW Law[1], KH Wong[1], JML Ling[1], KM Kam[2], WYW Fung[1], WMW Cheung[1]
[1]Department of Biology, CUHK
[2]DH

Food-borne diseases such as salmonellosis and vibriosis are common public health issues around the world. The causative agents of salmonellosis and vibriosis are species of *Salmonella* and *Vibrio*. In Hong Kong, *Salmonella enterica* serovars Enteritidis and Typhimurium accounted for almost 50% of Salmonellosis. Salmonellosis is seldom fatal but it progresses occasionally to a systemic infection which is life-threatening. In addition, the emerging multidrug-resistant (MDR) S. Typhimurium strains complicate treatments, posing a serious threat to the public. We have proposed to construct a genome sequence database for local food-borne pathogens including *S.* Typhimurium and *V. parahaemolyticus*. We aim to investigate the genotypes and phylogenetic relationships of the local isolates and compare with strains worldwide. We determined the genome sequences of 6 *S.* Typhimurium Hong Kong clinical isolates with various degrees of resistance to ampicillin, chloramphenicol, ciprofloxacin, cotrimoxazole and gentamicin, and 10 *V. parahaemolyticus* Hong Kong isolates, using the Roche 454 FLX-Titanium pyrosequencer. Sequencing reads of each isolate were assembled using GS De Novo Assembler (Roche Diagnostics). Nucleotide-level variations, such as single nucleotide polymorphism (SNP), insertion, deletion, and inversion among local

isolates and several foreign strain sequences were identified using GS Reference Mapper (Roche Diagnostics). Protein genes were predicted from the assemblies using GeneMark and other prediction tools. The preliminary assemblies of *S.* Typhimurium yielded 86 – 1254 contigs of N50 contig length 6 kb – 225kb. More than 50 insertions of at least 500 bases and 1000 SNPs were identified as potential DNA sequences for marker development. In addition, gene composition and gene sequences were compared with the reference genome sequence of strain LT2 to reveal both known antibiotic resistance mechanisms and potential novel resistance determinants. Based on the phenotypes, we have identified 184 orthologs as candidate multidrug resistance determinants in *S.* Typhimurium. Further analyses are in progress to identify their roles in drug resistance. We have also assembled the genome sequences of 10 *V. parahaemolyticus* isolates (92 – 1184 contigs of N50 contig length 7kb to 375kb) and compared them with the reference strains. We identified novel multi locus sequence types and sequence variations among strains of same serotype and multilocus sequence type. High-resolution phylogenetic relationship of *S.* Typhimurium and of *V. parahaemolyticus* isolates were revealed. We are building an Ensembl-based web interface for the genome sequence databases. This interface will provide a user-friendly platform to access and analyse the genome sequences and annotations of these two pathogens. This platform will help to monitor trends of food-borne diseases and will serve as a model for the use of pathogen genome sequence in clinical investigations.

Ab163

Institutional risk factors for norovirus outbreaks in Hong Kong elderly homes: a retrospective cohort study

H Lin[1], S Ng[2], S Chan[2], WM Chan[2], K Lee[1], SC Ho[1], L Tian[1]
[1]School of Public Health and Primary Care, CUHK
[2]DH

Background: Most of the institutional outbreaks of norovirus in Hong Kong occur in elderly homes, the proportion being 69% in 2006. Residents in elderly homes are a special population seriously affected by norovirus infections.

Objectives: To study the institutional risk factors for norovirus outbreaks in Hong Kong elderly homes using a retrospective cohort study.

Methods: A cohort of 748 elderly homes was followed up from January 2005 to December 2007; each elderly home was treated as one observation unit and the outcome event was the norovirus outbreak. Cox regression models were fitted to estimate the relative risk (RR) and 95% confidence interval (CI) for the potential risk factors.

Results: A total of 274 norovirus outbreaks were confirmed during the study period; the outbreak rate was 12.2 (95 CI: 9.9-14.6) per 100 home-years; elderly homes with a larger capacity (RR=1.4, 95% CI: 1.3-1.5 (per 30 additional residents)), a higher staff-to-resident ratio (RR=1.2, 95% CI: 1.1-1.3 (per 1 more nurses for 30 residents)) and better wheelchair accessibility (RR=2.0, 95% CI: 1.3-3.2) were found to have an elevated risk of norovirus outbreak in Hong Kong. Elderly homes with partitions between beds had a lower rate of norovirus outbreaks (RR=0.6, 95% CI: 0.4-0.8).

Conclusions: Elderly home capacity, staff-to-resident ratio and wheelchair accessibility were risk factors for norovirus outbreaks in Hong Kong elderly homes. Supply of partitions between beds was a protective factor. Attendant-borne transmission might be an important transmission mode in the elderly homes. These results should guide infection control policy in Hong Kong elderly homes.

GI

Ab200
Acute gastroenteritis in Hong Kong: a population-based telephone survey

SC Ho[1,2], PH Chau[2,3], PK Fung[2], A Sham[1], EA Nelson[4], JJY, Sung[2,5]
[1]School of Public Health and Primary Care, CUHK
[2]Stanley Ho Centre for Emerging Infectious Diseases, CUHK
[3]Faculty of Social Sciences, HKU
[4]Department of Paediatrics, CUHK
[5]Department of Medicine and Therapeutics, CUHK

Only a small proportion of people with acute gastroenteritis (AG) come into contact with the formal health service, thus under-reporting of enterics based on this information is a recognised problem. We conducted the first population-based study in Hong Kong to investigate the disease burden of AG and also the types of risky behaviour that are more prevalent in those affected with AG.

The study was conducted in Hong Kong from August 2006 to July 2007. Study subjects were recruited through random digit-dialling with recruitments evenly distributed weekly over the 1-year period. In total, 3743 completed questionnaires were obtained. An AG episode is defined as diarrhoea $\geq$ 3 times or any vomiting in a 24-h period during the 4 weeks prior to interview, in the absence of known non-infectious causes. The prevalence of AG reporting was 7%. An overall rate of 0.91 (95% CI 0.81-1.01) episodes per person-year was observed with women having a slightly higher rate (0.94, 95% CI 0.79-1.08) than men (0.88, 95% CI 0.73-1.04). The mean duration of illness was 3.6 days (S.D. 5.52). Thirty-nine percent consulted a physician, 1.9% submitted a stool sample for testing, and 2.6% were admitted to hospital. Of the subjects aged $\geq$ 15 years, significantly more of those with AG reported eating raw oysters (OR 2.4, 95% CI 1.3-4.4), buffet meals (OR 1.8, 95% CI 1.3-2.5), and particularly cooked beef (OR 1.8, 95% CI 1.2-2.7) in the previous 4 weeks compared with the subjects who did not report AG. AG subjects were also more likely to have had hot pot, salad, partially cooked or raw egg or fish, sushi, sashimi, and 'snacks bought at roadside' in the previous 4 weeks. Results showed that the prevalence of AG in Hong Kong is comparable to that experienced in the West. This is also the first population-based study on the disease burden of AG in Asia.

Ab201
Acute gastroenteritis in the elderly homes of Hong Kong: a case-control study

SC Ho[1,2], PK Fung[2], LW Tian[1,2], T Kwok[3], N Lee[3], PKS Chan[4], M Ip[4], JJY Sung[2,3]
[1]School of Public Health and Primary Care, CUHK
[2]Stanley Ho Centre for Emerging Infectious Diseases, CUHK
[3]Department of Medicine and Therapeutics, CUHK
[4]Department of Microbiology, CUHK

Acute gastroenteritis (AG) outbreaks in elderly home are common. Though mainly a self-limiting condition, a small proportion of elderly persons develop secondary long-term illnesses and complications. This case-control study conducted from December 2007 to May 2009 aims to investigate the risk factors associated with AG in elderly homes in Hong Kong.

Thirty-four elderly homes in New Territories East participated in the study with 140 cases and 280 matched controls. For every AG case reported, two sex and age (within 5 years) and elderly home matched controls were selected. Data on socio demographic variables, hygienic practices, medical history, nutritional intake and health status were collected based on structured questionnaires administered through face-to-face interviews in the elderly homes by trained interviewers.

Multiple conditional logistic regression analysis showed that 'sometimes or never wash hand after toilet' OR:3.56 (95% CI: 1.68-7.54) [ref gp: wash hand every time after toilet] was the major significant risk factors for AG. Hospitalisation or having spent time outside of the home were also significant factors contributing to AG infection. Nutrition factors have also been found to be associated with AG. Institutional factors such as high health worker to resident ratio and lower frequency of routine cleaning practice were more common among the home with AG outbreak cases.

The study findings strongly support that poor hand-wash practice among the residents increases the risk of AG. Hospital acquired infection, Alzheimer disease, immobility and inadequate nutrition are also factors associated with AG risks and more attention should be paid to these high risk individuals. Public health messages should focus on these hygienic practices at both the individual and institutional levels.

Improving Health and Recognising Excellence

GI

Ab12
Natural history of cervicovaginal papillomavirus infections in immunocompetent and immunocompromised Chinese women

E Li[1], LS Tam[2], PKS Chan[3], SC Ho[4], TH Cheung[4], SF Yim[4]
[1]Department of Medicine and Therapeutics, CUHK
[2]Department of Obstetrics and Gynaecology, CUHK
[3]Department of Microbiology, CUHK
[4]Department of Community and Family Medicine, CUHK

Background: Data on the cumulative incidence and persistence on human papillomavirus (HPV) infection in women with systemic lupus erythematosus (SLE) were unknown, and the role of immunosuppression on the acquisition and persistence of HPV in SLE patients remained inconclusive.

Methods: A total of 145 SLE patients were evaluated at two or more semi-annual gynaecologic examinations that included a Pap test, a test for HPV DNA and clinical assessment to ascertain the incidence, clearance and persistence of HPV infection; the incidence of squamous intraepithelial lesions (SIL) in SLE patients; and to assess the association between demographics, clinical parameters, HPV infection, and the use of immunosuppressants and the development of SIL in SLE patients.

Results: Over the period of follow-up, 37/145 (25.5%) were found to have positive HPV infection. After excluding the 19 patients with positive HPV DNA at baseline, 18/126(14.3%) patients experienced at least one incident cervical HPV infection. The risk of acquiring any HPV infection in this cohort of patients was 18.4 per 1000 patient-months. The incidence of high-risk HPV infection was increased two-fold compared with low-risk HPV infection (12.8 and 5.7 per 1000 patient-months, respectively). Nine (6.2%) patients experienced at least one incidence of multiple HPV infection. The majority (17/19 or 89.5%) of patients who had positive HPV DNA at baseline cleared the infection at 6.1 (5.8-24.3) months. Eighteen (12.4%) patients experienced at least 1 episode of persistent infection. Half of the HPV infections persisted for at least 6 months (26/52 vs. 13/23 in the high-risk and low-risk group, respectively). The risk of persistent HPV infection was 9.6 per 1000 patient-months. Eleven out of 141 (7.8%) patients developed at least one episode of SIL. The independent risk factor for the incident SIL in this group of SLE patients included higher number of flares (p=0.021, OR 3.5, 95% CI 12.2-10.2), HPV infection ever (p=0.007, OR 12.9, 95% CI 2.0-80.9), and persistent high-risk HPV infection (p=0.028, OR 10.0, 95% CI 1.3-77.9).

Conclusions: Patients with SLE had a high risk of acquiring high-risk HPV infection, and half of the infections persisted for at least 6 months. Independent risk factors associated with the development of SIL included a higher number of disease flare, HPV infection ever and persistent HPV infection.

Ab58
Characterisation of novel anti-HIV-1 natural product analogues

X Lu[1], H Xue[2], L Liu[1], G Liu[2], Z Chen[1,3]
[1]AIDS Institute, Li Ka Shing Faculty of Medicine, HKU
[2]Institute of Materia Medica, China Academy of Medical Sciences & Peking Union Medical College, Beijing, PR China
[3]Department of Microbiology and Research Center for Infection and Immunity, HKU

Background: Due to the lack of a protective vaccine or a therapeutic cure, the clinical management of HIV-1 infected people relies heavily on life-long anti-retroviral therapy (ART) and new drug development. We recently reported a natural product-derived (+)-Calanolide A analogue, 10-chloromethyl-11-demethyl-12-oxo-calanolide A (F18) as a new anti-HIV-1 NNRTI. Here, we aim to further characterise F18 as a clinical drug candidate.

Methods: Resistant viruses were selected after rounds of viral passages in the presence of two-fold increasing concentrations of F18. GHOST (3)-CCR5 cell line and PBMCs were used to evaluate the antiviral potency of F18 against the NRTI, NNRTI, PI drug resistant isolates in the world. The synergistic effect of F18 was also determined by conducting two drug combination assays using the MacSynergy II analysis.

Results: F18 displays potency against wild-type HIV-1 NL4-3 with an IC_{50} of 62 ± 13 nM, which is close to an IC_{50} of 27 ± 15 nM of NVP in the same PBMCs-based assays. L100I was the dominant resistant mutation induced by in vitro F18 selection. F18 showed an excellent antiviral activity against Y181C ($IC_{50}=1.2$ nM). V106A, V179D, K103N/P225H, which are commonly found during ART, were also sensitive to F18 with an $IC_{50}= 75.5$ nM, 14.7 nM, and 48 nM, respectively. Moreover, in comparison to NVP, F18 was similarly effective against viruses containing NRTI or PI resistant mutations. Lastly, the antiviral activity of F18 was synergistic with FTC, 3TC, ddC, and NEF, and additive with AZT, ABC, TDF, NVP, ETR, EFV, RTV and RAL.

Conclusions: Our data suggest that F18 is a promising novel NNRTI candidate to be developed for treating AIDS patients. The clinical development of F18 may reduce the treatment cost and enrich the ART regimens in Hong Kong and in the world. Our platform of technology also provides an innovative approach of developing anti-viral drugs from natural products, which has critical implications for studying Chinese herbs.

Ab139

Characterisation of HIV-1 integrase nuclear translocation for development of new class of anti-AIDS drugs

OMG Gu[1], J Chan[1], H Lin[1], DTM Ip[1], JCK Ngo[2], JJ Chen[3], YT Zheng[4], DCC Wan[1]
[1]School of Biomedical Sciences, CUHK
[2]Department of Biochemistry, CUHK
[3]Kuming Institute of Botany, Chinese Academy of Sciences, Kunming, PRChina
[4]Kuming Institute of Zoology, Chinese Academy of Sciences, Kunming, PRChina

Translocation of viral integrase into the nucleus is a critical precondition for integration during the life cycle of HIV, the causative agent of Acquired Immunodeficiency Syndrome (AIDS). It is considered an important target for drug development to treat AIDS. In order to understand the detailed mechanisms of integrase-host cell protein complex interactions, we cloned HIV-1 integrase-EGFP into pTRE2hyg as visible tag to monitor the translocation process. When transiently transfected this vector into Tet-off ready HeLa cells, the EGFP: integrase is mainly localised in the nucleus. We hypothesise that any drugs that can inhibit the translocation process are novel class of drugs for AIDS treatment. More than 30,000 compounds and 20,000 natural products were screened by virtual screening. A total of 26 compounds were obtained and screened for their ability to block the nuclear entry of HIV-integrase by monitoring the EGFP fluorescence in the cells by high-throughput live cell imaging. Eight synthetic compounds (DWIN4, DWIN5, DWIN6, DWIN9, DWIN15, DWIN16, DWIN17, DWIN21) and one natural product (DWIN719) were found to block integrase translocation significantly. According to our screening result, we have synthesised in-house a compound, designated as INNB-1. Both the INNB-1 and DWIN719 showed significant inhibition on P24 production in acute infection of human T cell line C8166 with HIV-1 IIIB. IC50 was in $3.92 \sim 5.05 \mu M$ and $2.68 \sim 4.33 \mu M$, respectively.

Ab159

HIV as a cofactor of mycobacterial infections: suppression of cellular antibacterial effects

JCB Li, HCH Yim, DCW Lee, ASY Lau
Cytokine Biology Group, Department of Paediatrics and Adolescent Medicine, HKU

Background: HIV infection remains a major public health threat worldwide. According to UNAIDS in 2008, there were 33.4 millions of people living with AIDS and 2.7 million of people newly infected with HIV worldwide. In Hong Kong, AIDS is controlled with effective public education, well-developed healthcare system and outreach by social workers. Since HIV could perturb the host immune response and successfully evade the immune system, concurrent infections with pathogens including bacteria and viruses are common in AIDS patients. However, cytokine and interferon responses during opportunistic infection in HIV-infected patients are not well understood. Since our previous results illustrated that HIV-1 Tat contributes to the HIV-induced immune dysregulation, we investigated whether the protein may play a role in perturbing the LPS-induced cytokine responses.

Methods: Human primary blood monocytes/macrophages were treated with recombinant HIV-1 Tat protein and followed by stimulation with LPS. The expression levels of cytokines were determined by quantitative polymerase chain reaction and enzyme-linked immunosorbent assay.

Results: HIV-1 Tat suppressed the LPS-induction of IFN-beta and concomitantly upregulated IL-6 expression in primary blood monocytes/macrophages, whereas the viral protein had no significant effects on TNF-alpha expression. We further investigated the underlying mechanisms involved in cytokine dysregulation. Western blot analysis demonstrated that LPS-activated ERK1/2 could be inhibited by Tat but not by the p38 mitogen-activated protein kinase. In addition, the data

from immunofluorescence assays illustrated that the viral protein could suppress LPS-induced activation of NFkappaB p65 which resulted in the retention of NFkappaB p65 in the cytosol.

Conclusions: Understanding HIV pathogenesis is an important step in developing effective anti-HIV treatments. Our findings suggest that Tat may play a role in modulating the immune responses triggered by other co-infecting pathogens, and thus providing a permissive environment for both HIV and other opportunistic microbes.

Improving Health and Recognising Excellence

Ab07
Utilisation pattern of primary health care services in Hong Kong: does having a family doctor make any difference?

CLK Lam[1], GM Leung[1], SW Mercer[2], DYT Fong[1], A Lee[3], TP Lam[1], Y Lo[1]
[1]HKU
[2]Section of General Practice and Primary Care, University of Glasgow, UK
[3]School of Public Health and Primary Care, CUHK

Aims: Primary care should gate-keep secondary health services, improve health, enable coping with illness and satisfy needs. The aim of this study was to find out the utilisation rate and pattern of primary care services, and the process and outcomes of primary care consultations in Hong Kong, and whether having a family doctor makes any difference.

Methods: A cross-sectional general population random telephone survey was carried out in two phases cover the Summer 2007 and Winter 2008, respectively. A structured questionnaire on the presence and type of regular primary care doctor, medical service utilisation of last illness, process and outcome of the last consultation, health status and socio-demographics was administered. Multivariate regressions controlling for health status and socio-demographics were carried out to determine the effect of having a RFD on the utilisation pattern, process and outcomes of primary care consultations.

Results: 3148 (60.8% of 5174 contacted households) subjects with a mean age of 40.2 (SD18.1) and 41% males. 1969 (62.5%) subjects had a regular primary care doctor with 36.5% reported as family doctors (RFD) and 26.5% other doctors (ORD). 1157 (36.8%) did not have any regular doctor (NRD) and 95 (3%) were not sure. During their last episode of illness 71.7% consulted a primary care doctor, 7.3% attended the accident and emergency (A&E) department and 3.1% were admitted to the hospital. 70% felt more enabled to cope with their illness, 49% perceived an improvement in health and >90% were satisfied with the last consultation. The rates of non-drug managements ranged from 3.7% for referrals to72% for explanation of diagnosis. People with a family doctor (RFD) were less likely to use accident and emergency service (OR 0.624 vs. NRD and 0.479 vs. ORD); more likely to report disease screening (OR 1.5 Vs. NRD), health improvement (OR 1.4 Vs. NRD) and better enablement (PEI score 3.3 in RFD Vs. 2.6 in ORD and NRD) from the consultation than people without a family doctor.

Conclusions: The results provide evidence to support a family doctor-led primary care service in Hong Kong. Primary care is most effective in gate-keeping secondary care and enabling illness coping among people who have a regular family doctor. People without a regular primary care doctor tended to use A&E service more but reported a benefit from primary care less. Having any regular primary care doctor is associated with better care than not having any. Every person should have a regular primary care doctor who is preferably a family doctor.

Ab19
Morbidity and management patterns of community-based primary health care services in Hong Kong

YYC Lo[1], CLK Lam[1], SW Mercer[2], DYT Fong[1], A Lee[3], TP Lam[1], R Lee[4], B Chiu[5], J Tang[6], B Chui[7], D Chao[8], A Lam[8], K Chan[1]
[1]HKU
[2]University of Glasgow, UK
[3]School of Public Health and Primary Care, CUHK
[4]The Hong Kong College of Family Physicians
[5]Hong Kong Sanatorium & Hospital
[6]United Christian Nethersole Community Health Service
[7]Evangel Hospital
[8]HA

Background: Hong Kong has a dual healthcare system in which primary care is provided by both private and public sectors. Understanding the current morbidity and management pattern can help identify the health and healthcare needs of the general population.

Aims: To describe the current morbidity pattern as presented to primary care doctors in Hong Kong and to find out the management behaviour of these doctors.

Methods: Using a practice-based prospective recording of all consecutive patient encounters primary care doctors collected information of all patient encounters in one or more pre-set data collection weeks from July 2007 to June 2008 using standardised forms.

Results: 109 doctors took part and recorded more than 69,000 health problems in over 50,000 consultations. The most common problem for consultation was upper respiratory tract infections (26.4%) followed by hypertension (10.0%), diabetes (4.0%), gastroenteritis (3.9%) and lipid disorder (2.7%). More acute problems and more preventive care were encountered in the private sector while more chronic illness in the public sector. Doctors who had family medicine training were more involved in chronic disease care than those without. Prescription was given in 90% of all consultations and investigation was ordered in 9.0%. Referral to all other health care agencies was made in 3.6% of all consultations and surgery was being most frequently referred to (16.8%) followed by physiotherapy (14.1%). Preventive activities e.g. blood pressure measuring, lifestyle, vaccination and cancer screening advice were offered in almost 60% of all consultations. Within the private sector, patients with medical fee reimbursement were more likely to consult for acute (OR 1.17) and chronic problems (OR 1.21), have investigation ordered (OR 1.23) and referral made (OR 2.25). Doctors who had training were less likely to prescribe antibiotics (OR 0.68), non-benzodiazepine hypnotics (OR 0.46) and anti-depressants (OR 0.62). However they ordered more investigation (OR 2.01) and made more referrals (OR 1.79).

Conclusions: Primary care doctors manage a diversity of health problems and majority of which can be managed initially in primary care as indicated by the low referral rate. There is room for expanding the role of primary care in chronic disease and preventive care in the private sector. Funding methods and family medicine training were shown to have various effects on the morbidity and management patterns. Our study has identified areas of health care service needed. It should be useful in guiding healthcare policy and the content of undergraduate medical curriculum and family medicine training programmes.

Ab38
Assessment of the health impacts and economic burden arising from proposed new air quality objectives in a high pollution environment

HK Lai, CM Wong, SM McGhee, AJ Hedley
School of Public Health, HKU

We conducted a health impact assessment of the government's proposed new air quality objectives (AQO) in Hong Kong, a high pollution environment. We based this on the World Health Organization (WHO) 2005 Air Quality Guidelines (AQG) and used a lognormal probability density function to model possible changes in annual mean pollutant levels resulting from the new AQO. All of the proposed short-term AQO were based on WHO interim targets (IT) or AQG, but allowed additional exceedances of these single limit values. Compliance with these short-term AQO may reduce (18-30%) the current annual mean concentrations but the distribution proportions exceeding the annual or annualised AQG remain high (83-100%). For SO_2, the proposed 24-hr AQO of 125 μg m^{-3}, with 3 days exceedances, cannot ensure reduction of the current annual mean but may legally permit an increase of the pollutant concentration distribution. If the proposed legal limits of AQO are fully exploited by polluters, we estimated the annual number of avoidable deaths at 1860, and avoidable health care events at 5.2 million doctor visits and 92,745 hospital bed-days with a total annual community cost of US$2.6 billion. The proposed AQO may only reduce the current air pollution health impacts by 17% but could achieve 41% reduction if additional exceedances were not permitted. An epidemiological approach should be adopted to assess external costs arising from modifications of WHOAQG and support accountability in air quality policy and management. This analysis of the WHOAQG in a high pollution setting also demonstrates problems

arising from the absence of annual limits for some pollutants and the discordance between the short-term and annual AQG, suggesting that revisions based on a lognormal probability model should be considered.

Ab62
Clinical efficacy of a community occupational therapy programme on functional competence of persons with dementia and skill enhancement of caregivers: a randomised controlled trial

JCC Chung[1], TCY Kwok[2], RCK Chung[1]
[1]Department of Rehabilitation Sciences, PolyU
[2]Department of Medicine and Therapeutics, CUHK

Background: While persons with dementia present declining functional competence, family caregivers experience increasing difficulties to assist/support their dementing relatives to take part in functional tasks because of communication breakdown and advancing cognitive deficits. Overseas studies have reported the benefits of community occupational therapy programmes in promoting functional competence of persons with dementia and reducing caregiving burden. Nonetheless, caring skills of caregivers and longer-term effects of these programmes were not examined.

Aims: To investigate the clinical efficacy of a community occupational therapy programme (COTP) on (1) fucntional competence of older adults with dementia and (2) caring skill enhancement of family caregivers, at both short-term (post-intervention) and longer-term (6-month follow-up).

Methods: Single blind randomised controlled trial. 150 dyads (older persons with mild to moderate dementia and their primary family caregivers) are recruited from day care centres and enhanced home and community care service teams. Subjects of the experiemenial arm receive COTP at home while subjects of the control arm receive an educational programme on ageing and dementia. A 10-hour programme over 5 weeks. Comprised three components: (1) subjects with dementia are trained to use compensatory and environmental strategies for functional task performance, (2) caregivers are taught the use of cognitive and behavioural strategies to facilitate subjects' performance in functional tasks, and (3) if needed, environmental adaptations are provided to promote attention, orientation, and safe performance. Caregivers are given a handbook on caring skills and techniques and examples of engaging persons with dementia in functional tasks. Subjects' functional competence are measured by the process scale of Assessment of Motor and Process Skills (AMPS) and family caregivers' skill enhancement are evaluated by Task Management Strategy Index (TMSI).

Results: The study is still in progress. A handbook for caregivers and a training manual for occupational therapist have been produced.

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Ab74
Survey on community pharmacist intervention in tobacco addiction, financial motivation for smoking cessation, and the retail cost of nicotine-replacement therapy in Hong Kong

KG Lau[1], GMF Lui[2], SSY Cheung[2], CYY Lam[2]
[1]The Practising Pharmacists Association of Hong Kong
[2]School of Pharmacy, CUHK

Background: Community pharmacists are convenient, cost-effective and competent providers of smoking cessation services to the general public. Nicotine-replacement therapy (NRT) may be purchased over-the-counter (OTC) in community pharmacies in Hong Kong as an aid to smoking cessation. Indeed, community pharmacists can furnish information on diseases associated with smoking, and the benefits of smoking cessation. However, these skills have been under-utilised in Hong Kong and there has not been a concerted effort to promote smoking cessation services in community pharmacies.

Aims: This study investigates the barriers to community pharmacist intervention in tobacco addiction.

Methods: A survey was undertaken in Hong Kong to gauge public opinion on the suitability for community pharmacist intervention in tobacco addiction, the retail cost of NRT, and the financial motivation for smoking cessation. Treatment costs of major smoking-related diseases were calculated. A total of 50 smokers and 50 non-smokers were surveyed to assess the suitability for community pharmacist intervention in tobacco addiction, the retail cost of NRT, and the financial motivation for smoking cessation.

Results:
(i) Retail cost of NRT = HKD\$1600-4000 per treatment course.
(ii) Majority of smokers were not persuaded by the treatment cost of lung cancer (70%), stroke (84%) and cardiovascular disease (82%) to quit smoking.
(iii) Perceived motivation to quit arising from the fixed penalty of HKD\$1500 for smoking in a prohibited area was significantly different for smokers (24%) and non-smokers (48%).
(iv) Perceived motivation to quit arising from the retail cost of purchasing cigarettes in Hong Kong was significantly different for smokers (20%) and non-smokers (54%).
(v) Majority of smokers (80%) considered the price of NRT to be prohibitive, and might be persuaded to quit smoking if NRT was provided free-of-charge.
(vi) Only 40% of the smokers interviewed considered community pharmacists to be suitable for providing smoking cessation services.

Conclusions: Many smokers and non-smokers were not fully aware of the smoking cessation services and capabilities of community pharmacists. Treatment costs associated with major smoking-related diseases were unlikely to motivate smoking cessation. Retail cost of NRT was prohibitive for the majority of smokers surveyed. Cost of purchasing cigarettes and the possibility of incurring a fixed penalty did not persuade the majority of smokers to quit.

Ab83
Formulating a comprehensive elderly healthcare policy in Hong Kong: how to learn from good governance principles?

WK Tsoi
Kadoorie Institute, HKU

With the rise of ageing population, Hong Kong's health sector has faced enormous pressures and demands on service provision for the elderly. Under the Government's elderly care policy "age in place", all relevant public institutions including policy bureaux, Hospital Authority, Department of Health and so on have been launching various programmes and services to cater for the ever-changing needs of the elderly.

In regard to the schemes in healthcare spectrum, three-year pilot scheme of health care vouchers for the elderly launched in 2009 and pilot shared care programme on trial this year are major initiatives from the Department of Health and the Hospital Authority, respectively. They run in different formats but share the same ambitious objectives – through allocating public resources to shift the elderly to utilise more private medical services, so as to reduce the burden of public hospitals.

However, the programmes have received less support from the elderly. The common criticisms refer to the insufficient financial incentives to the users and doctors as well as lack of adequate medical service providers. In short, the new initiatives fell short of garnering public's support and doomed to failure without further transformations. At the same time, some comparatively small scale and collaboration projects on elderly services between hospital institutions and social services centres seem to have higher popularity and effectiveness than the above media icon. For instance, 'Lai King elderly service scheme' is a partnership project between Princess Margaret Hospital and South Kwai Chung service centre starting in 2008. Under the scheme, a registered nurse from the hospital has stayed and followed-up frequent hospital users for six months. Until late March, it is found that the number of admission to Accident and Emergency Units was reduced by 20%.

Currently, Hong Kong lacks a comprehensive elderly health care policy and so there are a lot of piecemeal elderly service projects. To better understand such projects in a comprehensive and comparative manner, principles of 'good governance' will be applied to assess the effectiveness of major elderly care schemes operated by different service providers. 'Good governance' doctrine has been advocated

by various regional and international organisations to raise the governing standard of countries. In 2000, World Health Organization upheld domains of stewardship as a function of the health system. Major criteria include formulating strategic policy direction, building partnership, ensuring accountability, and so on.

Through theoretical illustrations and empirical testing, the paper aims at proposing a gateway to improve governance and formulation of the elderly care policies in a practical manner. It is expected that real medical demands of the elderly will be demonstrated clearly by evaluating and contrasting the program objectives and its implementation details. More important, we could understand how far our elderly care policies and programmes are in line with the principle of good governance.

Ab88
Enhancing primary care: the feasibility of enhancing the primary eye care service in primary healthcare

RWM Sum[1], MKH Yap[1], DSH Wong[2], R Gangwani[2], C Lam[2], W Ko[3]
[1]PolyU
[2]HKU
[3]Aberdeen Jockey Club General Out-patient Clinic

Background: Patients attending for primary healthcare at the Hospital Authority's General Out-patient Clinics (GOPC) often complain about minor eye and vision problems. Many of these patients are referred on secondary care in hospital eye departments for further assessment. If the GOPCs had access to the appropriate skills and equipment as well as the human capacity, then the experience in many countries show that referrals to secondary care would be more precise, thereby minimising the burden on secondary care.

Aims: To explore the feasibility of enhancing primary care through the incorporation of a primary eye care service in GOPC.

Methods: A part-time primary eye care service was set up in the Aberdeen Jockey Club General Out-patient Clinic in January 2010. An optometrist was engaged to assist in the delivery of the service. General practitioners in Aberdeen and Ap Lei Chau General Out-patient Clinics referred patients who presented with complain(s) involving the eye or vision to the optometrist for further assessment. Depending on the nature of the referral, the assessments conducted may include visual acuity measurement, anterior and posterior ocular health assessment using slitlamp biomicroscopy. A report of the findings was delivered to the referring general practitioner with recommendations for further action, if any.

Results: From January to May 2010, 177 patients were referred to the primary eye care service. The age range of the patient was from 5 to 85 years. The majority (60%) of the referrals from general practitioners were for the purpose of assessing ocular conditions associated with chronic systemic diseases such as diabetes mellitus and hypertension. Among these, 6.6% required closer monitoring of systemic diseases; none required referral for secondary or tertiary intervention. Thirty percent (53/177) of the patients attended for a cataract assessment. Among these, 7.5% (4/53) were referred to the hospital eye service for further cataract assessment. The vision of most patients (88%) who complained of blur could be improved by pin-hole. These patients were advised to seek a refractive error assessment in the private sector. Overall, 7.3% of the patients were referred to the hospital eye service for further assessment and management of the ocular diseases (significant cataract, neuropathy, glaucoma, wet macular degeneration and pterygium removal).

Conclusions: The data show that many presenting eye and vision problems in GOPC can be dealt with at the primary care level. General practitioners and family physicians working together with optometrists in primary care may substantially reduce the burden on secondary eye care.

Ab105
Changing infant feeding models: impact of cessation of complimentary infant formula in public hospitals on the duration and exclusivity of breastfeeding

M Tarrant, DYT Fong, ILY Lee, EMY Wong, A Sham, C Lam, JE Dodgson
School of Nursing, HKU

Aims: To investigate the impact of free infant formula supplied to hospitals and mothers on breastfeeding duration and exclusivity in infants.

Methods: This study will employ a prospective before-after two-group design. Patients admitted to the obstetric units of four hospitals in Hong Kong were recruited prior to the policy implementation of cessation of free infant formula from manufacturers, and will serve as the comparison group. Immediately after the policy implementation, a second post policy implementation group of patients will be recruited.1417 breastfeeding mother-infant pairs will be recruited from four hospitals in Hong Kong. Median duration of any and exclusive breastfeeding and supplementation rates while in hospital will be measured for breastfeeding mothers both before (Phase I) and after (Phase II) the cessation of complimentary infant formula in the study hospitals. Prevalence of exclusive, predominant, and non-exclusive breastfeeding at 0, 1, 2, 3, and 6 months of age and prevalence of any or partial breastfeeding at 6, 9 and 12 months of age in breastfeeding infants before and after the cessation of complimentary infant formula.

Results: Only Phase I results are reported. The median duration of any and exclusive breastfeeding in the sample was 8 weeks and 2 weeks, respectively and the mean number of infant formula supplements given to infants in the first and second 24 hours of life were 2.73 (SD=3.11) and 2.51 (SD=2.31), respectively. At 1 month, 2 months, 3 months, 6 months, 9 months, and 12 months only 63.3%, 46.7%, 37.5%, 26.9%, 18.9%, and 12.5% of the infants were still receiving any breast milk, with approximately one-half of participants exclusively breastfeeding. Compared with infants who received no formula supplementation (exclusive breastfeeding) while in hospital, participants who were given breast milk for > 2/3 of total feeds had a 50% increased risk of weaning (HR=1.54, 95% CI 1.29-1.84), participants who were given breast milk for 1/3 to 2/3 of their total feeds had approximately 80% greater risk of weaning (HR=1.82, 95% CI 1.51-2.20), and participants who received breast milk for less than 1/3 of total feeds had double the risk of weaning (HR=2.07, 95% CI 1.61-2.66). Only 5% of mothers experienced all six baby-friendly practices. After controlling for all other baby-friendly practices and possible confounding variables, exclusive breastfeeding while in hospital was protective against early breastfeeding cessation (OR=0.63; 95% CI 0.44 to 0.92). Compared with mothers who experienced all six baby-friendly practices, mothers who experienced ≤1 baby friendly practice were almost five times more likely to discontinue breastfeeding (OR=4.49; 95% CI 2.15 to 9.38).

Conclusions: High rates of infant formula supplementation of breastfeeding babies during the hospital period are a major factor affecting breastfeeding duration. Stopping the supply of free infant formula in public hospitals is essential to reducing formula supplementation of healthy newborns. Greater exposure to all baby-friendly practices would substantially increase breastfeeding duration.

Implications: Infant formula supplementation has a negative impact on the duration of any and exclusive breastfeeding. Removing free infant formula from public hospitals would reduce the amount of in-hospital infant formula supplementation and increase breastfeeding.

Ab146
A 3-tier community wound management model in General Outpatient Clinics in Hong Kong East Cluster

CW Ho, AKK Lam, JKW Wong, CSK Leung, LYC Yam
Hong Kong East Cluster Hospitals, HA

Background: Escalating demand in wound dressing poses a severe burden in GOPC. Unhealed or prolonged healing of wounds are often due to lack of standardised wound assessment; planning and advanced intervention, resulting in unnecessary dressing frequency and heavy workload. A 3-tier wound management model was piloted in HKEC to improve wound care.

Aims: To evaluate the effect of a new 3-tier wound management model in improving GOPC wound care in HKEC

Methods: Through the well-structured inter-disciplinary collaboration and consultation, a new 3-tier model aims at achieving timely, safe wound management by consistently adopting best practices. The HKEC Nurse Consultant (Wound) started by conducting relevant up-to-date training to empower all levels of GOPC nurses towards fulfilling their future roles in the 3-tier model. Frontline nurses are responsible for

screening and early identification of complications through appropriate classification and measurement of wound healing time for different wound categories. Advanced Practice Nurses then devise wound management plans to be operationalised by the GOPC nursing team, while the Wound Consultant would provide advanced investigations and interventions if healing is delayed with respect to the plan.

Results: From 1/4/2009 to 31/3/2010 (09/10); 71,046 dressings were performed in HKEC GOPC, representing a decrease of 17% compared to 2008/09 and 20% compared to 2007/08 respectively. The number of patient attendance and time to healing were also improved.

Conclusions: A well-structured collaborative HKEC 3-tier wound management model has achieved significant improvements in GOPC wound management in HKEC through staff empowerment, early identification of complications, well-developed treatment plans and specialist input when required. Its success has encouraged HKEC to extend the 3-tier model to the hospital setting in the year 2010/11.

Ab156
A randomised controlled study of Pre-discharge Planning and Post-discharge Support Programme in Pamela Youde Nethersole Eastern Hospital of the Hong Kong East Cluster

SSF Wong[1], YP Chan[1], WL Ngai[1], L Chan[2], SM Wong[2], SM Cheung[2], SH Yeung[1], SK Li[1], LYC Yam[1]
[1]Department of Medicine, PYNEH
[2]Department of Community Nursing Service, PYNEH

Background: Unplanned readmission (UPR) rate of PYNEH Department of Medicine was consistently high (13.4%). Discharge planning with organised community care post-discharge may promote early discharge and care continuity from hospital to community.

Aims: To examine the effectiveness of a nurse-led Pre-discharge Planning and Post-discharge Support Programme (PPPSP) in maintaining discharged patients at high risk of readmission in the community and reducing their use of healthcare services.

Methods: Medical patients admitted from the PYNEH Accident and Emergency Department (A&E) at high risk of UPR were identified by ward nurses according to inclusion criteria: One or more of: (i) multiple chronic medical diseases and polypharmacy, (ii) impaired mobility and function, (iii) psychological problems, (iv) social deprivation, and (v) history of repeated admissions. Patients admitted from elderly homes were excluded. Recruited patients gave informed consent and were randomised into PPPSP or Usual Care (UC, usual hospital care and post-discharge support as arranged by case doctor) group in a 2:1 ratio. A designated Advance Practice Nurse assessed PPPSP patients' physical and psychosocial needs to develop comprehensive management and discharge plans with multi-disciplinary collaboration and patients and caregivers involvement. Patients and caregivers were supported for 28 days by designated Community Nurses to provide case management, disease education and counselling through home visits and telephone follow-ups. The programme was designed and supported by a multi-disciplinary team of geriatricians and rehabilitation personnel. Outcome measures were UPR rates, readmissions, average length of hospital stay (ALOS) and A&E attendances at 180 days post-discharge.

Results: From October 2007 to September 2009, 2,684 patients (1784 PPPSP and 900 UC) were enrolled. UPR rate within 28 days post-discharge (16.0% vs 19.1%) was lower in PPPSP patients. PPPSP patients also had lower PYNEH A&E attendance rate (1.22 vs 1.43), overall readmission rate (0.9 vs 1.25) to PYNEH(Med) and ALOS (4.85 days vs 6.2 days) than UC at 180 days post-discharge. ALOS from overall readmissions to all HKEC medical departments was also lower among PPPSP (9.18 vs 11.35 days). Sub-group analysis of 1,385 PPPSP patients enrolled in 2008 showed lower overall readmission rate (0.92 vs 1.23) and ALOS (4.87 days vs 5.93 days) at 180 days post-discharge. Beneficial effect was sustained in overall readmission rates (1.49 vs 1.92) and ALOS (7.23 days vs 8.68 days) at 365 days.

Conclusions: A dedicated nurse-led discharge planning model for in-patients at high risk of readmission combined with coordinated home-based medical and psycho-social support were effective to reduce the subsequent use of healthcare services, with sustained beneficial effects at 365 days after discharge. The model is safe and cost-effective and can be used by all hospitals caring for patients at risk of unplanned readmissions.

Ab179
A willingness-to-pay study of healthcare insurance schemes in Hong Kong

H Leung[2], AYC Hung, KL Leung[3], AYY Chan[2], EK Yeoh[1], H Mak[4], KS Wong[2], MCM Leung[1]
[1]School of Public Health and Primary Care, CUHK
[2]Department of Medicine and Therapeutics, CUHK
[3]Department of Surgery, CUHK
[4]Department of Diagnostic Radiology, HKU

Aims: To examine the asymmetric preference of willingness-to-pay (WTP) over a range of insurance packages pertinent to the setting of Hong Kong. Hypothetical comparison is made between out-of-pocket payment and purchasing private health insurance.

Methods: Field survey in the form of a healthcare financing questionnaire with 4 imaginary packages: (1) rare but important illness (1/500 chance of HK$5000 payout), (2) treatable common illness(1/60, HK$6000), (3) disaster plan(1/600, HK$120000) and (4) categorical chronic illness (1/50, HK$150000). A method similar to conjoint analysis was used. 173 participants aged 18+ under employment with a mean age of 33.9 years, 55.5% male were surveyed. The individual mean WTP (for each package) and overall WTP were calculated. Data on age, sex, approximate monthly income were collected.

Results: The individual mean WTPs for Packages 1-3(HK$44.9, HK$145, HK$295) were higher than the actuarially-fair values (HK$10, HK$100, HK$200) whereas that for Package 4 (HK$2580) was lower than the actuarially-fair value (HK$3,000). The only difference in pattern in the individual mean WTPs versus actuarially-fair values was found for the group >=60 years and in those with highest income. The overall WTP was HK$2,369.5 (short of the actuarially-fair overall value of HK$3,310). In only two groups were these values higher than the actuarially-fair values: those aged >=21-30 years (WTP=HK$2,860) and the group with the second highest income (WTP=HK$3,045).

Conclusions: Volunatary private insurance is acceptable to public when compared directly with out-of-pocket payment. Low probability risks may be over-weighed and high probability risks underweighed. This has practical implications for offsetting adverse selection and for the design of chronic disease packages.

Ab181
Medication reconciliation for medical inpatients: a prospective study in Pamela Youde Nethersole Eastern Hospital

SYC Fan, SYM Leung, TH Tsoi, SK Li, LYC Yam
PYNEH

Background: To study the impact of a model of combined medication reconciliation (MR) and clinical pharmacy interventions (CPI) in preventing medication errors and adverse drug events in a medical admission ward in PYNEH.

Methods: Medical records of patients admitted to the 37-bed Study Ward were prospectively assessed by a dedicated Clinical Pharmacist (CP) who would conduct interventions whenever required. Unintended medication discrepancies (UMD) were defined as the differences between the best possible home medication list and the actual admission medication orders identified by CP and agreed with attending doctors (MO i/c). Severity index was classified based on Overhage. Clinical interventions were defined as CP's recommendations targeted towards prevention of potential adverse drug events (ADEs) which were adopted by MO i/c. Baseline UMD data was taken for the same ward for one month before the study. Primary outcomes: Number of patients with ≥1 UMD on admission and/or discharge and number of clinical interventions made. Secondary outcomes: Potential impact of UMD and clinical interventions targeted towards ADE prevention.

Results: Baseline data on 173 admission medical records in Nov 2008 showed that 51 records (29.5%) had UMD (=50 potential errors by item per 100 admissions, mean medication number per admission=5.1). The study was prospectively conducted for one year in April 2009-March 2010 on 3980 records on admission/discharge. At least one UMD was found in 497/3980 records (12%, representing 26 potential errors by item per 100 admissions and 14 per 100 discharges, mean medication number = 6 per admission and discharge). If unresolved, most (98%) would have led to minor–to-

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significant outcomes but 2% could have been potentially serious or even lethal. 796 clinical interventions were made to prevent potential ADEs, 7% of which, if unresolved, could have led to serious or even fatal consequences.

Conclusions: A model of comprehensive medication review with reconciliation at admission/discharge followed by clinical pharmacy intervention has significantly prevented medication errors and improved patient safety in a medical ward of PYNEH. The presence of a dedicated clinical pharmacist offers in-depth knowledge of drugs used in HA and the private sectors, enables direct interaction with and observation of patients and application of evidence-based medicine, thus fostering collaboration of multidisciplinary teams and immediate attention to anomalies in patients' drug treatment. Concurrent feedback to doctors has shown significant improvements on reducing UMD. Implementation of this model should be considered in all hospitals to improve patients' safety. To further improve the model, clinical pharmacists could also follow-up patients post-discharge with a view to reducing drug-related re-admissions.

Ab187
Lean management of the discharge process in Pamela Youde Nethersole Eastern Hospital

SH Yeung[1,4], WF Ho[2, 4], S Liu[3,4], C Leung[4], SK Li[1], LYC Yam[1]
[1]Department of Medicine, PYNEH
[2]Department of Surgery, PYNEH
[3]Department of Psychiatry, PYNEH
[4]Nursing Service Division, PYNEH

Background: Medical beds are congested in the Department of Medicine PYNEH due to demand from its elderly population. Efficient patient flow on discharge is essential to free up beds for patient admission from Accident & Emergency department (A&E) and a Lean Six Sigma project was conducted to manage the discharge process.

Aims: To shorten the discharge turnaround time (TAT) towards improving the efficiency of medical bed utilisation, and to engage patients/relatives and staff in the discharge process.

Methods: All members of the department were engaged and empowered through collaborative input in the design of the project. From August 09 to February 10, the five Phases of Lean Six Sigma methodology.

Results: Mann-Whitney Test was used to compare the outcome of pre- and post-improvement data. It showed that the duration of Key Factors in all wards improved gradually especially in sub-acute wards. In particular, median discharge TAT of sub-acute ward was significantly decreased from 335 to 208 minutes (P=0.0027) for discharges utilising NEATS & from 185 to 135 minutes (p= 0.0311) for discharges without utilising NEATS.

Conclusions: Application of lean management to the discharge process in acute medical wards was effective in enhancing the patient discharge process and efficiency of care through eliminating wastes. Staff engagement and commitment, multidisciplinary collaboration, inter-departmental and inter-hospital communications and management support are the critical success factors in this project. Similar practices could be adopted in other departments and hospitals to promote efficient and cost-effective care.

Ab190
Self-management and the role of pharmacists in developing an effective primary care system: developing a consensus-based policy framework

FWK Chan[1], FYY Wong[1], JHS You[2], ELY Wong[1], VCH Chung[1], CH Lau[1], EK Yeoh[1], SM Griffiths[1]
[1]School of Public Health and Primary Care, CUHK
[2]School of Pharmacy, CUHK

Background: Patient self-management is an effective approach to managing patients with stable chronic conditions. Previous studies have supported that pharmacists are the appropriate health professional to lead self-management.

Aims: To examine the perspectives of physicians, pharmacists, traditional Chinese medicine (TCM) practitioners and dispensers and

the local population on self management and the role of pharmacists in self-management; and to develop a consensus-based policy framework.

Methods: Data on the use of western and Chinese over-the-counter products collected by Thematic Household Survey during Nov 2005-Mar 2006 was analysed statistically. Nine homogeneous focus groups with 51 subjects from the four professions were conducted. Patient self-management, roles of pharmacists and collaboration were discussed. A 68-item, Chinese questionnaire covering self-medication, attitudes towards pharmacist-led self-management and demographics was used in a telephone survey. Residential households were randomly selected and Hong Kong residents who were ≥18 years were identified and interviewed. Using Delphi, 19 participants from the four professions rated the validity and clarity of the statements derived from findings of the focus groups and telephone survey. Statements with high validity and clarity were retained for the development of the consensus based framework.

Results: The four professions generally agreed that patients should self manage their health but only the pharmacists supported pharmacist-led patient self-management. The physicians, TCM practitioners and dispensers believed that pharmacists could manage drug-related issues only and therefore, they could only play an assisting role in patient self-management. There appeared to be insufficient trust of pharmacist's capacity to work patient self-management as many patients and health professionals were not familiar with their roles besides drug management. Development of an electronic patient record system which could be accessed and updated by pharmacists and continuing pharmacy education to ensure the training and quality of care of pharmacists were also suggested.

Conclusions: Self-management of patients with chronic conditions was supported. Role of pharmacists has to be considered to be extended in health services. The pharmacist-led approach on patient self-management needs to be developed gradually provided that the barriers are minimised and more facilitating measures are developed.

Implications: The consensus-based policy framework can facilitate the promotion of pharmacist role in primary care. It will also help development of self-management programmes and health care services for patients with chronic conditions.

Ab192
A qualitative study of the views of patients with long-term conditions on family doctors in Hong Kong

SW Mercer, JY Sui, SM Hillier, CLK Lam, YYC Lo, TP Lam, SM Griffiths
School of Public Health and Primary Care, CUHK

Background: Primary care based management of long-term conditions (LTCs) is high on the international healthcare agenda, including the Asia-Pacific region. Hong Kong has a 'mixed economy' healthcare system with both public and private sectors with a range of types of primary care doctors. Recent Hong Kong Government policy aims to enhance the management of LTCs in primary care possibly based on a 'family doctor' model. Patients' views on this are not well documented and the aim of the present study was to explore the views of patients with LTCs on family doctors in Hong Kong.

Methods: The views of patients (with a variety of LTCs) on family doctors in Hong Kong were explored. Two groups of participants were interviewed; a) those who considered themselves as having a family doctor, b) those who considered themselves as not having a family doctor (either with a regular primary care doctor but not a family doctor or with no regular primary care doctor). In-depth individual semi-structured interviews were carried out with 28 participants (10 with a family doctor, 10 with a regular doctor, and 8 with no regular doctor) and analysed using the constant comparative method.

Results: Participants who did not have a family doctor were familiar with the concept but regarded it as a 'luxury item' for the rich within the private healthcare system. Those with a regular family doctor (all private) regarded having one as important to their and their family's health. Participants in both groups felt that as well as the more usual family medicine specialist or general practitioner, traditional Chinese medicine practitioners also had the potential to be family doctors. However most participants attended the public healthcare system for

management of their LTCs whether they had a family doctor or not. Cost, perceived need, quality, trust, and choice were all barriers to the use of family doctors for the management of their LTCs.

Conclusions: Important barriers to the adoption of a 'family doctor' model of management of LTCs exist in Hong Kong. Effective policy implementation seems unlikely unless these complex barriers are addressed.

Ab193
Incentivising primary care through voucher: can it make a difference?

CHK Yam[1] OHY Huang[1], PSK Chong[2], SM Griffiths[1]
[1]School of Public Health and Primary Care, CUHK
[2]DH

Background: As pointed out in the Healthcare Reform Consultation Document, a change is needed in our healthcare system. There is considerable potential in public-private partnerships to improve the quality and efficiency of publicly-funded primary care services, including the purchase of primary care services from the private sector. Thus, the Government has launched an Elderly Healthcare Voucher Scheme in 2009 for 3 years to provide 5 vouchers of $50 each to elders aged 70 or above annually as partial subsidy for using private primary care services.

Aims: This study aims to evaluate the impact of voucher scheme by firstly assessing elders' awareness and attitudes towards the scheme. Methods: A cross-sectional questionnaire survey among the elders aged 70 or above was conducted in February to June 2010. The elders were randomly selected in the public parks, public clinics including General Outpatient Clinics and Elderly Health Centres, and private clinics through face-to-face interview/ telephone interview.

Results: In total, 1026 elders were successfully interviewed with a response rate of 79.2%. 71.2% of elders were aware of the voucher scheme. Among them, 31.1% thought the information regarding the scheme was not sufficient while 24.9% thought the information was fair. Only 35.0% of the elders had ever used the voucher scheme. Regarding elders' perception towards the scheme, 65.0% and 63.7% agreed that the voucher scheme was useful and convenient to use, respectively. However, only 31.9% said the scheme encouraged them to use the private healthcare services more than before. In addition, 66.2% mentioned that the scheme did not change their behaviour on where to go to see the healthcare professionals. 68.0% expressed that the subsidy amount of $250 per year was not enough. There was statistically significant difference on the perceptions among the elder recruited in the parks, public clinics and private clinics – in particular that elders in the public clinics tended to consider that the voucher would not change their health seeking behaviours.

Conclusions: The findings have provided important information to policy makers in reviewing the effectiveness of the Scheme by taking into account the elders' views. Most of the elders thought the scheme did not encourage them to use more private primary care services than before as well as it did not change their health seeking behaviours. It might be partly due to the small amount of subsidy that could not incentivise them to change their behaviour. Also, there was concern of insufficient information to the elders on how to use the vouchers. The Government should consider more publicity as well as consider adjusting the voucher amount in order to make a difference to the elders' choice of primary care services through the proposed public-private partnership, using vouchers as a lever for change.

Ab199
Public Private Partnership in confronting swine flu H1N1 pandemic in Hong Kong

CSC Fung, ELY Wong, SYS Wong, SM Griffiths
School of Public Health and Primary Care, CUHK

Background: To determine factors that are associated with changes of general practitioners' service delivery and information/education needs before and after changes of pandemic alert issued by the WHO.

Methods: A cross-sectional survey was conducted in Hong Kong with 266 (pre-pandemic) and 398 (post-pandemic) registered doctors responded between May to July 2009. Pre- and post- pandemic phrases were defined by the period before and after 11 June 2009 respectively when WHO announced the swine flu pandemic. Non-parametric data were analysed using chi-square test.

Results: When the results were compared before and after the pandemic, there was a significant increase in proportions of doctors willing to strengthen the public-private partnership in the contribution of care for patients by means of transferring patients with chronic diseases to private clinics (p = 0.031), but not in the form of employing private doctors to help in the public sector (p = 0.283). Fewer doctors used guidelines to assist diagnosis of H1N1 (p=0.001) and fewer doctors wanted more training and professional education relating to how to deal with H1N1 (p<0.001).

Conclusions: Doctors appeared willing to share the patient load but not the work load within the private-public partnership during a pandemic. They were less likely to use guidelines as reference in their practice or be interested in receiving professional education with respect to the pandemic. In view of the labour-demanding and variability of the pandemic, there may be a need to ensure the smooth sharing of patient caring load and that doctors are informed of the latest updates and evidence-based knowledge with respect to the pandemic.

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Ab205
Disease variation in unplanned 30-day hospital readmission

ELY Wong, AWL Cheung, CHK Yam, FWK Chan, MCM Leung, EK Yeoh
School of Public Health and Primary Care, CUHK

Background: Hospital readmission is becoming more and more important indicator for improving the quality and efficiency in healthcare. High healthcare expenditure is driven by the readmission. Clinician, researchers and policymakers are trying to develop a better understanding of variations in the patient socio-demographics, diagnosis, and processes of medical care to the hospital readmission. This paper is to compare the disease variation in 30-day hospital readmission through accident and emergency (A&E) department and related health outcomes.

Methods: We used Hong Kong Hospital Authority Database which contains patient demographics, the discharge diagnosis, date of admission, date of discharge, length of stay and discharge disposition for all patients discharged from public hospitals in Hong Kong from 1 January to 31 December 2007. The number and percentage of readmissions within 30 days were calculated for various diseases; and its corresponding length of stay and health outcomes were also calculated.

Results: A total 56,329 out of 269,963 patients were readmitted through accident and emergency department within 30 days after the index discharge from 1 January 1 to 31 December 2007. Among the 30-day readmission through A&E department, the mean age was 75.2 years old (SD 14.6) and majority of them were male (53.7%), and living in the elderly home (65.5%). The average length of stay including acute and rehabilitation care was 6.6 days (SD 9.8) and the average mortality rate was 8.9%. The proportions of 30-day readmission by various diseases were ranged from 8.8% to 37.4%. The most frequent diagnosis for 30-day readmission was nephritis nephritic syndrome and nephrosis (37.4%) and followed by chronic liver disease (31.0%), malignant neoplasms (30.3%), septicaemia (25.6%), pneumonia (25.3%), heart disease (23.4%), injury and poisoning (16.4%), diabetes mellitus (15.9%), aortic aneurysm (13.2%) and cerebrovascular disease (8.8%).

Conclusions: Unplanned 30-day readmission is an important adverse outcome of health care system. Results indicated the patients with nephritis nephritic syndrome and nephrosis and chronic liver disease were two most common diagnoses for 30-day readmission. Continued attempts should be made to explore the disease variation in readmission in assessing provider quality and planning appropriate resources allocation.

Ab207
Patient engagement to identify areas for service improvement in adult medical wards of Pamela Youde Nethersole Eastern Hospital (PYNEH)

T Leung[1], P Chee[1], C Chung[1], R Wong[2], SH Yeung[3], D Wong[2], LYC Yam[3]
[1]Hospital Authority Leadership Pipeline (HALP) Class 1 participants, HK East Cluster
[2]Community Patient Resource Centre, PYNEH,
[3]Department of Medicine, PYNEH

Background: Effective doctor-patient partnership is conducive to clinical decisions which lead to effective treatment outcomes, and engaging patients in the care process is crucial for service improvement.

Aims: To identify areas for improvement in the patient journey in acute medical wards of PYNEH to facilitate design of care processes targeted to patients' need.

Methods: Literature review was conducted to identify suitable questionnaire for the survey. Three non-medical doctors led face-to-face interviews with adult patients recently discharged from the medical wards of PYNEH based on a standard Chinese questionnaire comprising 86 questions modified from the "Adult inpatient survey" questionnaire of National Patient Survey Programme, National Health Trust, UK developed by the Picker Institute. Fifteen questions grouped in 14 items were selected for further analysis with reference to the short form 15-item Picker Patient Experience (PPE-15) Questionnaire and results were benchmarked with international data.

Results: After literature review, 30 patients with chronic illnesses discharged in recent one month from adult medical wards in Pamela Youde Nethersole Eastern Hospital agreed to be interviewed and completed the survey. With regard to overall care and advocacy, 87% rated the hospital as excellent/very good/good which is comparable to data from New South Wales, Australia 2009, while 73% will definitely recommend the hospital to others. There were >40% negative response for 4 of the 14 selected items: 73 % reported "Not told about medication side effects", 69% reported "Family not given information needed to help recovery", 46% were "Not told about danger signals to look for at home" and 43% perceived that they were "Not sufficiently involved in decisions about treatment and care". Compared to international data, the most prominent deficiency was the provision of information to the family on medication side effects and ways to help patients recover. As a consequence, pharmacy service in medical wards was enhanced through delivery of drug education and health advice to patients and families by a clinical pharmacist.

Conclusions: Engaging patients to provide feedback is an effective means to identify areas for improvement towards implementing changes in the care process that are targeted to patient needs.

Ab208
Cost implications and hospitalisations in the sure study: structured versus usual care on renal endpoint in Type 2 diabetes

JCN Chan[1], GTC Ko[1], CY Yeung[1], WYS Leung[2], KW Chan[3], CH Chung[3], LM Fung[4], TP Ip[5], G Kum[6], KP Lau[7], IT Lau[8], JKY Li[9], SC Siu[5], MW Tsang[6], VTF Yeung[10], PCY Tong[1], WY So[1]
[1]Department of Medicine and Therapeutics, CUHK
[2]QEH
[3]PMH
[4]CMC
[5]TWEH
[6]UCH
[7]NDH
[8]TKOH
[9]YNH
[10]Our Lady of Maryknoll Hospital

Background: Diabetes is the leading cause of end stage renal disease (ESRD) in Hong Kong as well as worldwide.

Methods: In a 2-year multi-centred randomised study carried out in 9 public hospitals, Type 2 diabetic patients with chronic kidney disease receiving structured care (SC) delivered by a diabetologist-nurse team had similar incidence of end stage renal disease (ESRD) (24 in 104) compared to those receiving usual care (UC) (24 in 101). Patients receiving SC (63 in 104) were 3 times more likely to attain ≥3 pre-defined treatment targets than those receiving UC (28 in 101).

Results: Of 91 patients who reached ≥3 treatment targets, 14 patients died or developed ESRD compared to 34 in the remaining 114 patients with 60% risk reduction. The analysis and results for the primary outcome have been reported (Chan et al. Diabetes Care 2009; 32: 977-82). The total number of hospital days was 933 days in the SC group and 1169 days in the UC group with a cost difference of HKD 631,300 (USD 80,935). Assuming each patient in the SC group required 8 extra outpatient visits during the 2-year period, an extra cost of HKD 953,472 (USD122,240) was incurred for the SC group.

Discussion: Based on these estimations, an additional HKD 27,000-80,000 (USD 3,461-10,256) was required to treat a patient to multiple treatment targets or save one major clinical event. If trained nurses were used to review these patients under medical supervision, the SC model will be cost-saving in a public health care setting.

Ab211
Collaborative DM patient care programme between family physicians and diabetologists: a pilot model to enhance management of DM at primary care level

E Tse[1], C Ng[1], A Kwong[1], C Ngai[1], J Wang[1], C Sze[1], S Chou[1], W Ko[1], W Tsui[1], E Leung[2], WS Chow[2]
[1]Department of Family Medicine and Primary Healthcare, Hong Kong West Cluster, HA
[2]DM Centre, QMH

Background: Diabetes mellitus (DM) Joint Clinic is a pilot programme run by the Department of Family Medicine & Primary Healthcare, Hong Kong West Cluster (HKWC) and the DM Centre of Queen Mary Hospital (QMH). Commencing in 2006, it had served over 100 DM patients with special needs including secondary oral drugs failure, compliance problem, fluctuating sugar profile.

Aims: 1) To prevent complications by providing early joint intervention to complex DM patients; 2) To empower General Out-Patient Clinic (GOPC) staff in high level DM care, and 3) To relieve the patient load to SOPD

Methods: Upon its initiation, diabetologists from QMH provided training to the family physicians in Sai Ying Pun GOPC, including assessing patients with suboptimal DM control, skills in insulin treatment initiation and dosage titration. DM nurse specialists of QMH provided training to GOPC nursing staff on insulin injection techniques. Patients had been initiated insulin therapy, and learnt the insulin injection skill, in GOPC without being referred to DM centre in QMH since 2006. Most patients could be smoothly maintained on insulin treatment after 3 visits under the current programme.

Results: As of December 2009, 58 patients had been successfully put on insulin in Sai Ying Pun GOPC. The mean age was 62, ranging from 44 to 81 years old. Their average pre-treatment HbA1c was 9.8%. Overall, 61.5% of these patients had shown progressive improvement in HbA1c. Amongst those who showed improvement, 75% had more than 1 unit (%) sustained reduction in HbA1c levels after 6 months post insulin initiation. Only 2 patients (3.5%) were referred to the secondary hospital level for management of resistant DM conditions. The programme is now serving more complicated DM patients by family physician and diabetologist seeing the patient together in the same visit to formulate the most suitable management plan. This also provides continuous medical training opportunities for family physicians. To meet the growing needs of holistic DM care amongst our population, RAMP (Risk Factor Assessment and Management Programme) for DM would be implemented in the HKWC in the year 2010-2011.

Conclusions: The programme successfully enriches the HKWC GOPC staff's skills in initiating insulin injection and management of complicated DM conditions. This enhances their preparation of implementation of RAMP for DM, which is aiming to provide a more comprehensive care to DM patients in primary care settings in HKWC.

Ab219
What do Hong Kong's primary care doctors think of clinical practice guidelines? A focus group study and questionnaire survey

AKL Chan, R Baker, TP Lam, MBL Kwong, LWY Chan, TTC Hong
Research Fellowship, Hong Kong College of Family Physicians

Background: Well-planned implementation of high quality clinical practice guidelines (CPG) has been shown to improve the quality of primary care. In Hong Kong's recent health reform, CPG are being developed to set standards for primary care in areas such as the continuing and coordinated management of diabetes mellitus and hypertension.

Aims: To find out the usage of and attitude towards CPG among Hong Kong's primary care doctors.

Methods: 25 representative primary care doctors participated in 5 focus groups. Themes generated were used to develop a questionnaire posted to all members of the Hong Kong College of Family Physicians (HKCFP) in the period from March to June 2010.

Results: In the focus group study, participants were generally supportive of CPG and found them useful in assisting clinical decision making, setting the standard and improving the quality of patient care. Barriers in CPG implementation included guideline factors (credibility, consistency and applicability), patient factors (individual needs and expectations), practice factors (limited resources, lack of support from the administration, conflicts with current culture and norms) and doctor factors (habitual behavior, negative attitude). To promote CPG implementation, they suggested to establish a central system for adopting and disseminating CPG, involve primary care doctors in the development of CPG for local use, enhance support from primary care teams and financial incentives. The response rate of the questionnaire survey was 42.7% (610/1427). 91% of respondents had used CPG in patient care and 85% had used them within a month. "Contradicting recommendations" was ranked highest as a barrier (88%), followed by "CPG not tailored for individual patient's needs"(85%). There was unanimous agreement to what constitues a "good" CPG: evidence-based (98%), simple and easy to use (98%), applicable to the local population (98%) and the primary care setting (97%), regularly updated (97%) and with cost effective recommendations (93%). On strategies thought to be useful in promoting the use of CPG, 95% of respondents agreed on effective dissemination, 93% on a central system for adoption of CPG, 90% on involving primary care doctors in the drafting and 70% on providing financial incentives.

Conclusions: Focus group study from a representative sample of Hong Kong's primary care doctors showed that they were using and supportive of CPG in patient care, and would like to have a central system for adopting CPG for local use and improving accessiblity of CPG to end-users. They wished to have more support in implementing CPG and be involved in the development process. They thought that a good CPG should be evidence-based, simple and easy to use, applicable in the local primary care setting, regularly updated and showing cost-effectiveness. About half of HKCFP members responded to a questionnaire survey and the results were in line with the qualitative data from the focus groups. Local primary care doctors' views about CPG are important and relevant for Hong Kong's guideline development policy.

Ab228
Digital dashboard design for public health surveillance

EHY Lau, LM Ho, BJ Cowling, GM Leung
School of Public Health, HKU

Background: Great strides have been made exploring and exploiting new and different sources of disease data and developing robust statistical methods for analysing the collected data. However, there has been less research in the area of dissemination. User-friendly and contextualised dissemination remains a non-priority area of most national public health agencies worldwide. However it is important that the dissemination is not neglected, so that the "surveillance to action loop" is properly completed.

Methods: This study described the key features and aspects of a digital dashboard used for public health surveillance, to develop a generic framework for a digital dashboard incorporating these key features and to demonstrate this framework by specific application to influenza surveillance in Hong Kong. We reviewed national surveillance websites worldwide to identify key features of current surveillance dissemination. Based on the merits of the national websites and principles of efficient dashboard design, an automated influenza surveillance digital dashboard was designed as a demonstration of efficient dissemination of surveillance data. Multiple sources of influenza surveillance data streams can be synthesised and displayed graphically in the dashboard.

Results: 70 nation surveillance websites were reviewed. Many surveillance websites reported data in text-based reports. Information of different surveillance sources was usually not organised in a way that users may need to locate information from different pages or sections. Function for data retrieval was usually not provided. We designed and implemented an influenza surveillance dashboard which utilised self-explanatory figures to display multiple surveillance data streams in panels. Indicators for individual data streams as well as for overall influenza activity were all summarised in the main page which can be read at a glance. Data retrieval function was also incorporated to allow data sharing in standard format.

Conclusions: Our review of national surveillance websites identified features of current dissemination of surveillance data and areas that can be improved. The influenza surveillance dashboard serves as a template to illustrate the efficient synthesis and dissemination of multiple-source surveillance data which may also be applied to other diseases. Surveillance data from multiple sources can be disseminated efficiently using a dashboard design which facilitates the translation of surveillance information to public health actions.

Ab238
The impact of smoke-free policies on health outcomes

C So, SM McGhee, J Chau, CM Wong, TQ Thach, KP Chan, AJ Hedley
School of Public Health, HKU

Background: Hong Kong has implemented a smoke-free law to provide protection against secondhand smoking in indoor workplaces and public places, and new designated no smoking areas or establishments came into effect from 1 January, 2007; while some establishments were given exemptions and were not required to become smoke-free until July 2009.

Aims: Our aim was to examine the health effects of the implementation of smoke-free workplaces in Hong Kong.

Methods: Poisson regression models were used to examine trends in all cause and sub-categories of deaths and categories of admissions over 1997 to 2006, adjusted with background variables such as temperature, humidity, cycle of seasonality, air pollutant levels, smoking prevalence and other factors. We then examined any change in the outcomes after the implementation of the smoke-free law in the beginning of 2007. We also estimated the seasonal change in admissions and deaths in the pre- and post-intervention periods to evaluate the change in seasonal cycles for each condition that might be associated with the intervention.

Results: The annual proportional change in admission for all ages for IHD dropped by 9%, and for those aged 65 or older by 7.6%. The seasonal peak in admissions for respiratory disease in all ages was reduced from 12.6% to 10.1% in the first year after intervention; however, there was a rebound to 12.9% in the second year. For mortality, only that for all ages from lung cancer had an immediate drop by 5.7% after the intervention. The seasonal peak for deaths from IHD declined from 21.1% to 9.5% and for all natural causes from 11.7% to 8.7%. The seasonal peak of deaths from AMI also reduced in the first year but the change was not significant. In the second year, an increase in the seasonal peak in deaths was observed for IHD and AMI deaths, whose seasonal increase in amplitude returned to the pre-intervention level.

Conclusions: The predicted impact on hospital admissions and mortality from IHD was found after the implementation of smoke-free policies in Hong Kong. The 9% drop in admissions for IHD in Hong Kong is on the low side compared with other countries but Hong Kong had allowed exemptions from the smoke-free policy until mid 2009. Further analyses of future years' data will help to refine the precise benefit to health that has been brought by the amendments to the ordinance.

Improving Health and Recognising Excellence

Ab256

Using statistical and mathematical models to fine-tune service in an emergency department

CHL Tsoi, SY Ip, LK Poon
Accident and Emergency Department, NDH

Background: The Emergency Department (AED) attendance fluctuates greatly. It was felt that Monday was the busiest in the week. If this could be proved, some services reallocation could be an option to spread out the peak demand.

Methods: This is a retrospective study of the attendance pattern. The daily attendance from April to June 2010 was grouped in days of the week, in order to find out whether the attendance on Monday was different from the rest of the week.

Results: Monday was the busiest day of the week – it had significantly higher attendance than Wednesday, Thursday, Friday, Saturday and Sunday. Monday was also busier than Tuesday, although this is inconclusive. When we grouped the data into Monday and "non-Monday" and repeated the test, we found the same conclusion – Monday had significantly more attendance than the rest of the week.

Conclusions: It can be seen that "Monday is the busiest day" in AED is supported by scientific data. In our study, Monday is 12% busier than any other day.

Implications: It was not known until now that Monday has the highest attendance. Despite AED attendance fluctuating greatly, patterns of attendance are discernable. The study has an impact on service provision. Previously, we have a follow-up clinic on Monday with a quota of 30-40. With the new insight on attendance, it was decided by the department "not to book Monday as far as possible" and to reallocate follow-up cases to other days of the week to relieve the attendance stress on Monday.

Ab15
Antimicrobial nanostructured coatings deposited by low temperature, inexpensive, solution methods

AB Djurišić[1], WK Chan[2], FCC Leung[3], CMN Chan[3], AMC Ng[1]
[1]Department of Physics, HKU
[2]Department of Chemistry, HKU
[3]School of Biological Sciences, HKU

Antibacterial coatings are of significant interest for applications in health care and food industry for preventing the spread of infectious diseases. A variety of materials could be used for this purpose, but the most commonly used ones include nanostructured surfaces which contain either metal ions or metal oxides. Different materials have been studied in the literature, and different levels of effectiveness and mechanisms of antibacterial action have been reported. Those materials can be prepared by variety of deposition methods, which would affect their properties, as well as the cost of the coating. Therefore, we have concentrated on materials and morphologies which could be prepared by simple, low-cost, solution-based methods and studied their antibacterial activity. Initial tests of antibacterial activity have been performed using *B. atrophaeus* and/ or *E. coli* as representative test organisms. For materials exhibiting promising antibacterial activity, further tests have been conducted for *Salmonella enterica, Pseudomonas aureginosa, Bacillus megaterium, Staphylococcus aureus , Enterococcus faecium, Neurospora crassa, and Saccharomyces cerevisiae.*

We found that several metal- and metal oxide-based coatings exhibited antibacterial activity. While commonly used TiO_2 required UV illumination to exhibit significant antibacterial activity, other metal oxides such as ZnO and nickel oxide-based coatings exhibited significant antibacterial action under ambient illumination. Polymer coatings containing zinc and/or silver precursors also exhibited antibacterial activity without UV illumination. However, materials which exhibited antibacterial activity without UV illumination also commonly exhibited release of metal ions into the environment. While the metal ion release in some cases could be controlled by adjusting the coating composition, further study of coating safety and efficacy needs to be conducted in the future. While some of the materials studied have been shown not to represent a human health hazard and are approved for uses in sunscreens and cosmetics (such as ZnO and TiO_2), evaluation of their ecotoxicity should also be performed before their widespread use. There are rising concerns that nanomaterials released from various consumer products may represent a hazard to aquatic organisms.

Ref. No. RFCID: 07060602

Ab33
Effects of ventilation schemes and heat sources on the effectiveness of upper-room ultraviolet germicidal irradiation systems in hospital or health care facilities

ACK Lai
Department of Building and Construction, CityU

There has been an increasing interest in the use of the upper-room ultraviolet germicidal irradiation (UVGI) installation because of its potential disinfection effect to airborne microorganisms. It can be used for both high-risk and non-critical areas such as waiting halls or wards. The advantages of using UVGI for indoor environments include low initial and running costs, low maintenance requirement and portable. It can be applied easily for both new and retrofitted projects. The efficacy of the upper-room UVGI has been measured and reported in a number of literatures. However experimental measurements are tedious. Much that is currently understood about application engineering has been acquired by trial-and-error methods and translated into rules of thumb. An alternative way is to perform detailed mathematical analysis to predict pathogen concentration for indoor spaces. The current computational approach requires much effort on formulating the problem and considerable computational time is needed for modelling a realistic UVGI set-up. The objectives of the current project are to develop an effective computational tool to model the performance of UVGI systems and to identify and quantify the key parameters which affect the performance. We have developed a simplified model which can significantly reduce the preparation effort

and computational time. Preliminary results been validated against our own in-house measurements and the modelling predictions match the experimental data very well. The proposed numerical model can identify effective mitigation control measures, and the relative importance of UVGI installation as compared to other controls, for reducing public health risk from airborne infectious diseases. Hospital Authority and private hospital management teams will find the new model very useful as it will help them to design and optimise effective upper room UVGI installations in a much more effective way. With the new tool, it will significantly promote the applications of upper room UVGI for hospitals and health care facilities in Hong Kong.

Ref. No. RFCID: 08070892

Ab108
Aerosol dispersion during common respiratory therapies: a risk assessment model of nosocomial infection to healthcare workers

DSC Hui[1], BKM Chow[2], SD Hall[3], MTV Chan[4]
[1]Department of Medicine & Therapeutics, CUHK
[2]Department of Architecture, CUHK
[3]Department of Mechanical Engineering, UNSW, Australia
[4]Department of Anaesthesia & Intensive Care, CUHK

Background: Respiratory failure may occur in viral infections such as SARS and influenza.

Methods: As part of our infection control preparedness, we employed an established laser smoke visualisation method to reveal the full spectrum of aerosol dispersion (as marked with smoke particle) from a high-fidelity human patient simulator (HPS) during application of various common respiratory therapy on different medical ward senarios. The HPS was programmed to reproduce conditions of normal, mild and severe lung injury. The primary endpoint was the maximum aerosol (indicated by smoke) dispersion distance.

Results: a) Exhaled air and aerosolised droplet dispersion during application of a jet nebuliser. The maximum dispersion distance of smoke particles through the nebuliser side vent was 0.45m lateral to the HPS at normal lung condition (oxygen consumption 200 ml/min, lung compliance 70 ml/cmH_2O) but it increased to 0.54m in mild lung injury (oxygen consumption 300 ml/min, lung compliance 35 ml/cmH_2O), and beyond 0.8m in severe lung injury (oxygen consumption 500 ml/min, lung compliance 10 ml/cmH_2O). More extensive leakage through the side vents of the nebuliser mask was noted with more severe lung injury. Healthcare workers should take extra protective precaution within at least 0.8m from patients with febrile respiratory illness of unknown aetiology receiving treatment via a jet nebuliser even in an isolation room with negative pressure.
b) Exhaled air dispersion distances during non-invasive ventilation via different Respironics face masks. As inspiratory positive airway pressure (IPAP) was increased from 10 to 18cmH_2O with expiratory pressure fixed at 4cmH_2O, the exhaled air of a low normalised concentration through the *ComfortFull 2 mask* increased from 0.65m to 0.85m at a direction perpendicular to the head of the HPS along the median sagittal plane. When IPAP of 10cmH_2O was applied via the *Image 3 mask connected to the whisper swivel,* the exhaled air dispersed to 0.95m towards the end of the bed along the median sagittal plane whereas higher IPAP resulted in much wider spread of a higher concentration of smoke. Substantial exposure to exhaled air occurs within a 1m region, from patients receiving NPPV via the ComfortFull 2 mask and the Image 3 mask, with more diffuse leakage from the latter, especially at higher IPAP.

Implications: For patients in respiratory failure due to respiratory infections requiring non-invasive ventilation, it is advisable to apply face masks with predictable leakage distances and avoid the use of face masks that require connection to the whisper swivel device, which is efficient for removal of exhaled air but also results in marked room contamination even at low pressures.

Ref. No. RFCID: 06060202

Ab129
Exhaled air dispersion distances during non-invasive ventilation via different Respironics face masks

DSC Hui[1], BKM Chow[2], SS Ng[1], LCY Chu[3], SD Hall[4], T Gin[3], JJY Sung[1], MTV Chan[3]
[1]Department of Medicine & Therapeutics, CUHK
[2]Department of Architecture, CUHK
[3]Department of Anaesthesia & Intensive Care, CUHK
[4]Department of Mechanical Engineering, UNSW, Australia.

Background: As part of our influenza pandemic preparedness, we studied the exhaled air dispersion distances and directions through two different facemasks (Respironics, Pennsylvania, USA) attached to a Human-Patient-Simulator (HPS) during non-invasive positive pressure ventilation (NPPV) in an isolation room with pressure of -5Pa.

Methods: The HPS was positioned at 45° on the bed and programmed to mimic mild lung injury (oxygen consumption 300ml/min, lung compliance 35ml/cmH$_2$O). Airflow was marked with intrapulmonary smoke for visualisation. Inspiratory pressure (IPAP) started at 10cmH$_2$O and gradually increased to 18cmH$_2$O whereas expiratory pressure was maintained at 4cmH$_2$O. A leakage jet plume was revealed by a laser light-sheet and images captured by high definition video. Normalised exhaled air concentration in the plume was estimated from the light scattered by the smoke particles.

Findings: As IPAP increased from 10 to 18cmH$_2$O, the exhaled air of a low normalised concentration through the ComfortFull 2 mask increased from 0.65m to 0.85m at a direction perpendicular to the head of the HPS along the median sagittal plane. When IPAP of 10cmH$_2$O was applied via the Image 3 mask connected to the whisper swivel, the exhaled air dispersed to 0.95m towards the end of the bed along the median sagittal plane whereas higher IPAP resulted in wider spread of a higher concentration of smoke.

Conclusions: Substantial exposure to exhaled air occurs within a 1m region, from patients receiving NPPV via the ComfortFull 2 mask and the Image 3 mask, with more diffuse leakage from the latter, especially at higher IPAP.

Ref. No. RFCID: 06060202

Ab172
Performance of natural ventilation for infection control in a Hong Kong hospital

WH Ching[1], PTY Ching[2], CB Chow[3], CH Liu[1], WH Seto[2], WC Yam[1,2], Y Li[1]
[1]Department of Mechanical Engineering, HKU
[2]Department of Microbiology, QMH
[3]Department of Paediatrics and Adolescent Medicine, PMH

Background: WHO has published a guideline on using natural ventilation for infection control, and specified a requirement of hourly-averaged natural ventilation rate of 160 L/s per patient.

Aims: This study is to evaluate the effectiveness of natural ventilation for infection control using yearly measurement data in Hong Kong and investigate the implications of the airflow direction control in natural ventilation.

Methods: Between September and October 2009, five TB ward measurements were carried out in the naturally ventilated Hospital G and three measurements in the mechanically ventilated Hospital W.

Results: The median ventilation rates were 60 ACH in Hospital G and 14 ACH in Hospital W. The number of patients in the TB ward in Hospital G varied from 3 to 14. The ventilation rate was 80 to 360 L/s per patient during the test period. Tests data for the remaining period of measurement including indoor air temperature and humidity is being analysed and the results will be ready during the conference post session.

Conclusions: Natural ventilation can provide much higher ventilation rates for infection control than mechanical ventilation. However, many design, construction, operation and clinical issues need to be addressed. In addition to ventilation rate, natural ventilation design also need to consider other issues, including extreme cold and hot weather, moisture, noise, wind, storm, safety and security, thermal comfort of both HCWs and patients etc.

Ref. No. RFCID HA-NS-06

Ab173
Leaked air from an isolation room into another through the shared anteroom

WH Ching[1], PTY Ching[2], CB Chow[3], CH Liu[1], WH Seto[2], WC Yam[1,2], Y Li[1]
[1]Departments of Mechanical Engineering and Microbiology, HKU
[2]Department of Microbiology, QMH
[3]Department of Paediatrics and Adolescent Medicine, PMH

Background: Negative-pressure isolation rooms are commonly used to accommodate patients with airborne infectious diseases. Due to limited space and resources, an anteroom is used to connect more than one negative-pressure isolation rooms. Questions remain on the use of shared anteroom that may affect the efficiency of ventilation systems in a ward setting or an isolation room. Some existing isolation rooms use shared anteroom in our hospitals, although existing regulations do not allow so. Conceptually, since the air pressure in the anteroom is higher than the one in isolation rooms, the air should flow from the shared anteroom to the isolation rooms. In reality, this is not always true. The release of smoke parcel after the opening of an isolation door reveals that a bi-directional flow can be commonly observed. It may properly due to the temperature difference between two spaces. In addition, the vortex flow due to door sweeping and the movement of the health care worker also contribute a chance of "bringing" the contaminated air from the isolation room to the anteroom. In other word, this exhibits a probability of transferring the contaminated air from one isolation room to the neighbouring isolation room through the shared anteroom.

Methods: To quantify the above hypothesis, we measured the contribution of leaked air from an isolation room into another through the shared anteroom by using a tracer gas. Specifically, tracer gas is continuously released from one isolation room. The concentration of the tracer gas is continuously monitored in isolation rooms, at air supply inlet, and in the anteroom. Nine different set of experiments were conducted. Testing parameters include duration of the isolation door opening and its time lapse. In each experiment, our researcher walked from the source isolation room to the neighbouring room through the shared anteroom for simulating the movement of a health care worker.

Results: Experimental results indicated that up to 19 times and 1.5 times concentration of tracer gas is detected in the anteroom and the neighbouring isolation room, respectively, when compared with the background level.

Conclusions: Our data demonstrate a possibility for cross contamination between the isolation rooms through the shared anteroom. Patients with different diseases are not suggested to accommodate in isolation rooms sharing an anteroom.

Ref. No. RFCID: HA-NS-07

Ab174
Effect of human movement on dispersion of exhaled substances in multiple-bed isolation rooms

J Hang[1], PTY Ching[2], CB Chow[3], CH Liu[1], WH Seto[2], WC Yam[1,2], Y Li[1]
[1]Department of Mechanical Engineering, HKU
[2]Department of Microbiology, QMH
[3]Department of Paediatrics and Adolescent Medicine, PMH

Background: Questions remain on how movement of people affects the efficiency of ventilation systems in a ward setting or an isolation room. We apply computational fluid dynamics (CFD) to study human motion flows in a multi-bed environment.

Methods: We performed a detailed numerical study on the distribution of the exhaled particles and gaseous pollutant dispersion in an isolation room (6m long, 6.7m wide and 2.7m height) with six patients and one standing/walking nurse. The nine roof level supplies provided an air change rate of 12.9 ACH with ceiling level or floor level exhausts used. Two kinds of particles (diameter 1μm and 50μm) were released from the mouths of patients locating at different locations of the isolation rooms upwardly or laterally. Two locations of the nurse were considered: one is close to the patient, and the other is in the middle of isolation room.

Results: When the nurse starts walking, the moving body and swinging arms and legs may generate a kind of air motion and turbulence in a proximity volume around the nurse. When the nurse is very close to a source patient, both nurse body plume and walking may affect the dispersion of gaseous pollutant and the particle a little, and in most situations, such kind of human motion seems not to do any harm to the particle removal. When the nurse is far from the source patient, the effect of human motion may be neglected. When the nurse is walking close to a source patient and the particle injection is from the source patient to the nurse laterally, the effect of nurse motion is more important than that when the injection is from the source patient to the ceiling vertically. The small particles ($1\mu m$) seem easier to be removed by the ventilation systems, especially as the ceiling level exhausts are used, but for large particles ($50\mu m$), the deposition is important, i.e. an important fraction of large particles can't be removed out and may be trapped on the surfaces of tables and grounds.

Conclusions: The result illustrates the human movement produces some level of flow mixing in the ward. Such mixing plays a dual role, carrying the infectious droplet nuclei around and promoting mixing. In addition to human movement, body thermal plumes can also introduce mixing. The ideal one-way airflow does not exist in realistic isolation rooms. Hence there is a need to examine the current CDC ward ventilation design, which has been shown by our group earlier that can be significantly improved.

Ref. No. RFCID: HA-NS-07

Ab175
How do droplets dry out and become droplet nuclei?

L Liu, Y Li
Department of Mechanical Engineering, HKU

Background: Understanding how the exhaled droplets become droplet residues (droplet nuclei) is necessary for understanding mechanisms and control of disease transmission via large droplets and droplet residues. In this study, droplet residue is referred to as the final product of a respiratory droplet becomes after being released for a sufficient time.

Aims: Here we attempt to study the droplet residue size of a respiratory droplet, and understand how this droplet residue size is reached.

Methods: We first investigate the drying-out process of a single respiratory droplet, followed by studying the fate of droplets in an exhalation jet.

Results: Residue size is related to the humidity in the ambient air. In our simple model, when the air is dry, the residue size will be the size of the crust formed by the suspended particles in the droplet. When the air is humid, the residue size will be the equilibrium size. The residue size at relative humidity of 90% could be 1.6 times the residue size in dry air, when the initial salt concentration equals 0.9% and initial solid volume ratio equals 1.0%. The threshold relative humidity (TRH) is determined by initial salt concentration and initial solid volume ratio. The trajectories of droplets exhaled from a coughing jet are also obtained. Small or medium droplets can reach their residue sizes and travelling with the residue sizes in the air for several minutes or more. Large droplets may deposit on the floor before reaching their residue sizes. The distances that exhaled droplets can travel are estimated. The destinations of the droplets are related to their initial sizes. These findings are useful for both investigating the mechanism of disease transmission via large droplets or airborne routes and developing engineering control methods in hospitals and community.

Conclusions: Our results reveal that the residue size of the exhaled droplets is a function of indoor humidity and temperature, as well as droplet initial salt and solid concentration. Our data showed the importance of humidity in the formation process of droplet nuclei in air. There are evidences showing that indoor relative humidity influences the transmission of human respiratory diseases. Further study and field data are needed to fully understand the importance of absolute humidity or relative humidity in hospital environment.

Ref. No. RFCID: HA-NS-07

Improving Health and Recognising Excellence

Ab13
Physical environmental risk factors of elderly falls in urban Hong Kong

PC Lai[1], WC Wong[2], MH Chan[3], M Wong[3], CT Low[1]
[1]Department of Geography, HKU
[2]Department of Orthopaedic and Traumatology, KWH
[3]Department of Medicine and Geriatrics, KWH

Background: Elderly fall is an issue of great public health concern because it carries a great burden to the individuals and the society. Conventional studies have focused mainly on indoor-related falls using statistical methods and clinical tests. This study focuses on outdoor falls within an urban community in Hong Kong given that the number of outdoor falls exceeds that of indoors. Urban environmental hazards are often place-specific and dependent upon the built features, landscape characteristics, and habitual activities. Therefore, falls must be examined with respect to local situations.

Methods: The method involves collecting data on fall incidents and mapping their geographic positions to enable an ecological examination of the environmental circumstances of falls. Our study collected a total of 281 locations of outdoor falls within the normal catchment area of the Kwong Wah Hospital in 2006-07. High risk locations or hot spots of falls were identified by means of the nearest neighbour hierarchical and standard deviational ellipse techniques.

Results: The study identified eleven hot spots of elderly falls with unique environmental characteristics. Amongst various environmental attributes, busy streets and junctions, outdoor markets, and refuse collection points, exhibited a strong spatial relationship with the hot spots. The results also affirmed the multi-factorial nature of falls at specific locations and for select groups of the population.

Conclusions: The results have demonstrated that the combined use of descriptive and spatial analyses yields meaningful results that enable the identification of high risk locations. Spatial analysis is an essential way to understand the geographic nature of outdoor-related fall injuries which are not constant over space. Public health policy makers can devise different preventive measures to address location-specific environmental risk factors. More accurate information about environmental risk factors not only contributes to the aetiology of outdoor falls for the elderly but also alleviates if not overcome the situation.

Ab18
Surveillance of trauma patient: a case study on injury severity of bicycle casualties

KL Tsui[1], NN Sze[2], SC Wong[2]
[1]TMH
[2]HKU

The proportion of bicycle-related crashes to total road crashes in Hong Kong has increased, from 5.3% in 1997 to 12.7% in 2004. This has drawn the attention of researchers, practitioners, and authorities to develop cost-effective measures reducing bicycle-related crashes and injuries. This issue has first been attempted by a local trauma centre, using the data solely obtained from the trauma record. However, shortcomings include the lack of information on road environments and crash characteristics, that could determine the risk and mode of bicycle injury. This research gap shall be filled by a more comprehensive model established in current study, integrating the information on demographic characteristics, crash characteristics, infrastructure design, road environment, injury characteristics and injury severity level, with the use of Road Casualty Information System (RoCIS). RoCIS was jointly launched by the representatives from Hong Kong Police Force, Transport Department, and a regional hospital, aiming to link up the trauma records of casualty admitted to the trauma centre to the accident records maintained by the Transport Department and the police. RoCIS provides more accurate assessment on injury severity, injury characteristics and injury consequence, and at the same time comprehensive information on road environments, vehicle and crash characteristics, and thus enable more reliable and robust analyses for road casualties.

In this study, a multinomial logit regression model was established to determine the effects of demographic characteristics, temporal variations, impaired behaviours, use of protective devices, weather conditions, traffic condition, collision characteristics, and injury characteristics, on the likelihood of severe and life-threatening injury of bicyclists injured in road crashes, based on the information of 682 trauma patients reported to the trauma centre during the period 2004-06. Results indicate that middle age and elderly bicycle casualties are significantly more likely to have severe injury than other age groups. Bicycle injury is not merely a youth or child problem in Hong Kong. Bicycle casualties with severe head injury and with motor vehicles involved are significantly more likely to have life-threatening injuries. Unfortunately, the helmet wearing rate is extremely low and at 2% only. Results imply that education, campaign and enforcement could be targeted to middle-aged and elderly bicyclists on the motorway, to promote the use of protective devices and to enhance the compliance to traffic rules. Also, access of bicycle on the motorway should be scrutinised.

Ab32
Hong Kong Chinese school children with elevated urinary melamine level

APS Kong, KC Choi, CS Ho, MHM Chan, CWK. Lam, EKH Liu, WCW Chu, JCN Chan
Faculty of Medicine, CUHK

Background: Since the outbreak of kidney stones related to melamine-tainted milk products in Mainland China, the public concern of food safety has escalated to a new height. Hong Kong is closely connected to Mainland China. Food supplies and immigrants or frequent travellers from Mainland China are all potential reasons that Hong Kong children may be affected by melamine tainted food products. The clinical consequences of Hong Kong school children with elevated urinary melamine levels are yet to be evaluated.

Methods: We conducted a population recruited survey from all primary and secondary schools in Hong Kong using cluster sampling method. 2119 Chinese volunteers were recruited in 2007-08. Urine aliquots from 502 subjects were selected for assay of melamine level. High urine melamine level was defined as urine melamine/creatinine ratio $>7.1\mu$/mmol. Subjects with high urine melamine level were invited to have follow-up in 2009 and evaluations including urinalysis and ultrasound imaging of the urinary system were performed.

Results: Age of the study cohort ranged from 6 to 20 years with 66.7% boys (335 male and 167 female subjects). The spot urine melamine/creatinine ratio of the 502 urine aliquots assayed had value ranged from undetectable to 1467μ/mmol (median 0.8). Out of a total of 502 subjects, 213 subjects had undetectable spot urine melamine/creatinine ratio (42.4%). 47 (9.4%) subjects with high urine melamine level were identified. One subject refused to come back for follow-up study. Among 46 subjects (28.3% boys, mean age 13.9 +/- 2.9 years) with follow-up evaluation, none of them had any abnormality detected on ultrasound study of the urinary system. Urine albumin-creatinine ratio was 0.70 mg/mmol (interquartile range: 0.00 – 2.55).

Conclusions: Hong Kong Chinese school children with high urine melamine level appear to have benign clinical course in short-term. Long term follow-up study of children and adolescents with high urine melamine level is required.

Ref. No. MI-FU-04

Ab49
Secretion of cytokines stimulated by melamine and related crystals in a two-compartment culture system

CF Ng[1], JWM Yuen[2], E Hon[1], DIG Mayur[2]
[1]Department of Surgery, CUHK
[2]Department of Health Technology & Informatics, PolyU

Background: A two-compartment transwell culture system was established with human kidney cortical WT 9-12 cell line to assess the cellular response to melamine and related crystals. The model allows

the formation of tight junctions, which gives experimental access to both the apical and basolateral membrane domains of the cells. Crystals can be formed by mixing melamine and cyanurate at different ratios.

Methods: Clinically relevant mixture containing 99 parts of melamine and 1 part of cyanurate were studied. Artificial urine (AU) containing 99:1 and 50:50 ratios of melamine (50mM):cyanurate (50 mM) was added to the apical surface of the WT 9-12. Cells exposed to pure AU were used as control. Orbital shaking for 10 minutes at 37°C was applied to allow adequate mixing and physical contact. Subsequently, the AU in each well was replaced by complete medium, and further incubated for 24 hours. Trypan blue viable cell count was performed to assess cytotoxic effects, media were harvested to measure the levels of major T-helper 1(Th1)/T-helper 2(Th2) cytokines and chemokines (total of 15 cytokines) using FlowCytomix technology.

Results: At 24 hours after exposure, approximately 15% and 25% of viable cells were reduced by 50:50 and 99:1 ratios, respectively when compared with the AU control. Baseline levels of IL-6, IL-8, and MCP-1 were detected in the conditioned media of both apical and basolaterol sides, although higher levels were found in the apical media. These cytokines were all increased by the two tested ratios, except MCP-1 which was not increased by the 99:1 ratio. Furthermore, secretion of IL-5 was stimulated by both ratios. IL-5 is regarded as a Th2 cytokine that stimulates B cell growth and increases immunoglobulin secretion.

Conclusions: This suggests the shift of the cell microenvironment towards a Th2 type immune response which favours humoral response. The increased chemokines IL-8 and MCP-1 will enhance the migration of neutrophils and monocytes, respectively. The overall microenvironment suggests that melamine-cyanurate crystals cause cell injury on the monolayer of WT 9-12 cells, triggering pro-inflammatory reactions with the increase of cytokines IL-5, IL-6, IL-8, and MCP-1 to carry out an humoral immune response.

Ref. No. MI-BS-07

Ab50
The effects of Shi Wei (Folium Pyrrosiae) on melamine crystallisation

CF Ng[1], NW Poon[2], E Hon[1], DIG Mayur[2]
[1]Department of Surgery, CUHK
[2]Department of Health Technology & Informatics, PolyU

Background: Traditional Chinese Medicine (TCM) has been used for treating renal stones. Our findings showed that current therapeutic agents for the treatment of urinary stones can inhibit the melamine crystallisation. This study aims to understand the effects of a Chinese herb Shi Wei (Folium Pyrrosiae) on melamine crystallisation as our findings showed that Shi Wei has a potential to inhibit urinary crystallisation by reducing the specific gravity of urine and enhancing the urinary magnesium. Therefore, Shi Wei may also be a suitable therapeutic agent for the prevention of the occurrence and recurrence of melamine stones in infants.

Methods: An intervention study was conducted with normal subjects taking 1-g dose of Shi Wei twice per day for 1-week. Early morning urine were collected before, 1 day and 1 week after the intervention for melamine crystallisation study by the Mixed Suspension and Mixed Product Removal (MSMPR) system. The effect of Shi Wei is reflected from the subject's urine for 'potential' for melamine crystallisation.

Results: Urine from Shi Wei subjects showed an inhibitory effect on the melamine crystallisation at 24 hours after intervention by the reduction in the nucleation and growth rates as well as the suspension densities of melamine crystals. However, the inhibitory effect on melamine crystallisation was diminished or even levelled off at 1 week after Shi Wei intervention.

Conclusions: Shi Wei was effective for acute inhibition on the melamine crystallisation but its inhibitory effect was reduced for prolong treatment. Therefore, it is possible that our body can bring the urinary parameters back to its initial equilibrium levels by negative feedback events occurring inside our body.

Ref. No. MI-BS-07

Ab51
The effects of physicochemical changes in urine on melamine crystallisation

CF Ng[1], NW Poon[2], E Hon[1], DIG Mayur[2]
[1]Department of Surgery, CUHK
[2]Department of Health Technology & Informatics, PolyU

Background: Melamine stones present in infants were reported in China in 2008 that were related to the contamination of milk powder for infants. Our previous findings showed that the optimum ratio of melamine and cyanuric acid for melamine cyanurate crystallisation is 1:1 and the minimum concentration of melamine and cyanuric acid for crystallisation is 5 mM. This study aims to understand the effects of physicochemical changes in urine on melamine crystallisation so that suitable treatment for the prevention of the occurrence and recurrence of melamine stones in infants can be further investigated based on these findings.

Methods: Continuous flow crystalliser system, Mixed Suspension and Mixed Product Removal (MSMPR) and particle sizing machine, COULTER Multisizer III were used in this study to assess the crystallisation parameters of melamine. The effects of different urinary pH and ionic strength on melamine cyanurate crystallisation were studied.

Results: Urinary pH 6.0 to 6.5 was found to be the optimum pH for melamine cyanurate crystallisation since melamine cyanurate crystals had the highest growth rates and suspension densities at this pH range. Melamine cyanurate crystallisation at urinary pH 4.5 and below was found to be strongly inhibited. However, the changes in the urinary ionic strength did not affect the melamine cyanurate crystallisation.

Conclusions: Urinary pH is an important factor for the melamine cyanurate crystallisation. Currently therapeutic agents such as bicarbonate and citrate for the treatment of urinary stones use either chelation and/or changes in the urinary pH for successful prophylactic outcomes in the treatment of melamine stones.

Ref. No. MI-BS-07

Ab52
The effects of therapeutic agents in the treatment of urinary stones on melamine crystallisation

CF Ng[1], NW Poon[2], E Hon[1], DIG Mayur[2]
[1]Department of Surgery, CUHK
[2]Department of Health Technology & Informatics, PolyU

Background: Bicarbonate and citrate are the two common therapeutic agents used for the treatment of renal stones. Our previous findings showed that urinary pH is an important factor for the melamine crystallisation. This study aims to understand the effects of current therapeutic agents for the treatment of urinary stones by changing the urinary pH on melamine crystallisation so that suitable treatment for the prevention of the occurrence and recurrence of melamine stones in infants could be implemented.

Methods: Continuous flow crystalliser system, Mixed Suspension and Mixed Product Removal (MSMPR) and particle sizing machine, COULTER Multisizer III were used in this study to assess the crystallisation parameters of melamine. The effects of commonly used therapeutic agents for the treatments of urinary stones on melamine cyanurate crystallisation were studied.

Results: Citrate inhibited the melamine crystallisation by demonstrating a decreased nucleation rate and suspension density of melamine crystals (fewer crystals). Bicarbonate inhibited the melamine crystallisation by reduction in growth rate and suspension density of melamine crystals (smaller crystals).

Conclusions: Both citrate and bicarbonate can inhibit the melamine crystallisation. Citrate did slightly change the pH of the urine only and thus its action on melamine crystallisation may be due to its chelation effect with other cations in urine which reduced the supersaturation of urine. Bicarbonate significantly changed the urinary pH to above 7 that inhibits the formation of melamine crystals.

Ref. No. MI-BS-07

Improving Health and Recognising Excellence

Ab54
Chronic intake of melamine impairs renal blood flow and renovascular function in rats

XY Tian[1], WT Wong[1], CW Lau[1], YX Wang[2], ZY Chen[3], YL Wong[4], CS Mok[4], Y Huang[1]
[1]Institute of Vascular Medicine, CUHK
[2]Department of Radiology, CUHK
[3]Department of Biochemistry, CUHK
[4]Hong Kong Government Laboratory

Background: The contamination of milk products with melamine in Mainland China caused a widespread public health concern. The present study aims to examine whether ingestion of melamine and cyanuric acid can impair renovascular function and reduce renal blood flow in rats.

Methods: Melamine (60, 300 or 600 mg/kg/day) and cyanuric acid (150 mg/kg/day) were administered to 5-week-old rats daily. Vascular function of isolated intralobal renal arteries was assessed in myograph. Renal blood flow was examined by functional magnetic resonance imaging (fMRI).

Results: Chronic daily intake of melamine for 3 months reduced renal blood flow detected by fMRI. Melamine treatments reduced acetylcholine-induced endothelium-dependent relaxations (EDR) in a concentration dependent manner in renal arteries without altering sodium nitroprusside-induced endothelium-independent relaxations. Melamine treatment also augmented the endothelium-dependent contractions (EDC) in renal arteries. Acute 30-min incubation of thromboxane-prostanoid (TP)-receptor antagonist (S18886, 100 nM), cyclooxygenase-2 inhibitor NS398, or reactive oxygen species scavenger Tiron+DETCA in renal arteries from melamine-treated rats rescued the impaired EDR and abolished the augmented EDC. The results from the present study suggest that chronic exposure to melamine can damage renovascular function, probably through increases in cyclooxygenase-derived prostanoids and increases of oxidative stress in renal arteries. These findings will provide useful information for clinicians and researchers to have more understanding on the pathophysiological events related to the melamine incident.

Ref. No. MI-BS-12

Ab75
Melamine toxicity in foetus and infant

CY Chu[1], YWJ Chan[2], XZ Liu[2], KO Chu[1,3], PKJ Lau[2], SK Tsui[2], WG Sham[2], CM Lau[4], TL Ting[4], CWT Mak[5], CS Ho[6], HMM Chan[6], WKC Lam[6], CK Wong[6], SWA Shum[2], CP Pang[3], TK Lau[1], TF Fok[7], KP Fung[2], CC Wang[1,2]
[1]Department of Obstetrics & Gynaecology; CUHK
[2]School of Biomedical Sciences, CUHK
[3]Ophthalmology & Visual Sciences, CUHK
[4]Government Laboratory, HK
[5]Department of Chemistry, CUHK,
[6]Department of Chemical Pathology, CUHK
[7]Department of Paediatrics, CUHK

Background: Infants are more vulnerable to the toxicity of melamine.

Aims: The aim of this study was to identify the melamine toxicity in foetus and infant in order to establish pharmacokinetic, pharmacodynamic and teratogenicity data for melamine toxicity in foetus and infant in rats.

Results: During pregnancy, 80% of melamine was detected in maternal serum at short as 0.5 hr of intake. 30% of melamine further reached the fetuses through placental transfer after 2 hrs and 20% in amniotic fluid after 3 hrs. During lactation, 40% of melamine was transferred to breast milk and peaked at 3 hours, but declining to non-detectable level after 24 hrs. Pharmacokinetics of amniotic fluid and fetuses fit 1-compartment model, while maternal serum and breast milk fit non-compartmental model. Tmax: amniotic fluid>breast milk>foetus>maternal serum; Cmax: maternal serum>breast milk>foetus>amniotic fluid; and AUC: maternal serum>breast milk>foetus>amniotic fluid. Melamine in maternal serum, foetus and amniotic fluid dropped to undetectable levels in 24 hrs except breast milk. Half-lives: breast milk>amniotic fluid>foetus>maternal serum. In infants, only 30% of melamine was found in serum at short as 1.5 hr. Melamine further peaked at 60 ppb but <0.5% was detected in

infant kidney after 1.8 hrs. Pharmacokinetics of infant serum followed the 1-compartment model, while infant kidney the non-compartmental model. Tmax of infant kidney is 1.22 times longer than that of infant serum. Cmax and AUC of the infant kidney were much lower than those of the infant serum Half-life of infant serum was lower than that of infant kidney. LD50 with acute cardiac toxicity effects was 100 ppm and LD50 with acute renal toxicity effects was 30 ppm. Acute infant renal toxicity was presented as severe hydronephrosis in an early infant group. Chronic infant toxicity was presented as mild to modest hydronephrosis. Pathological examination confirmed all related to melamine nephrolithiasis. No foetal renal toxicity was observed.

Implications: The results not only provide background information to the public health systems on the concern of the potential short- and long-term developmental toxicity associated with fotal and infant exposure to maternal melamine intake, but also provide scientific data to regulate human products for pregnant/lactating women and infant in Hong Kong and worldwide.

Ref. No. MI-BS-06

Ab110
Case-control study of Sichuan and Hong Kong children with melamine associated renal stones: renal ultrasounds and urinary IL-8 and MCP-1

H Yang[1], WW Tu[2], H Luo[1], H Shi[1], WHS Wong[2], WWS Lau[2], KT Lam[2], H Li[1], PPW Lee[2], M Mao[1], YL Lau[2]
[1]West China Second University Hospital, Sichuan University, China
[2]Department of Paediatrics & Adolescent Medicine, HKU

Background: Outbreak of urinary stones related to consumption of melamine-tainted milk products (MTMP) occurred in China during September to November 2008. 51 children with renal stones were admitted to West China Second University Hospital (WCSUH) in Sichuan for treatment because of symptoms or severe ultrasound abnormalities. At same time, a total of 12 children with renal stones suspected to be related to melamine were reported in Hong Kong. However, the final outcome of these children remains unknown.

Aims: In this study, we monitored the renal stones by ultrasound and measured the urinary inflammatory cytokines IL-8 and MCP-1 in these children during one year of follow-up.

Results: 43 out of 51 children with renal stones in Sichuan and 9 out of 12 children with renal stones in Hong Kong have been recruited for one year follow-up. By end of one year follow-up, 67% (29/43) children in Sichuan and 22% (2/9) children in Hong Kong did not have any evidence of renal stones on ultrasound. Those children had comparable levels of urinary IL-8 as in normal controls. Importantly, children with persistent renal stones on ultrasound had significantly higher urinary IL-8 than children who did not have renal stones on ultrasound and normal controls. The levels of urinary IL-8 were positively correlated with the size and numbers of the renal stones. However, there were no differences in urinary MCP-1 among these 3 groups of children.

Conclusions: In conclusion, children with persistent renal stone on ultrasound have on-going renal interstitial inflammation, and IL-8 may be useful to help monitor children with persistent stone for on-going renal interstitial inflammation.

Ref. No. MI-FU-08

Ab123
The melamine milk - kidney and developmental toxicity: impact on the foetus and the disease development later in life

H El-Nezami[1], PKH Tam[2], ASY Lau[3], S Chen[1], F Leung[1], LCL Lan[2], MF Wang[1], Y Chen[2]
[1]School of Biological Sciences, HKU, [2]Department of Surgery, HKU
[3]Department of Paediatrics and Adolescent Medicine, HKU

Background: The recent scandal about adulteration with melamine and related contaminants in a variety of food products has greatly undermined the reputation of the food industry and a panic is growing in the public. Up till now, the formation of melamine-cyanuric acid co-crystals in kidneys has been identified as a major health consequence

from the consumption of melamine-contaminated food products. Recent reports demonstrated that the toxicity of melamine is significantly increased in the presence of cyanuric acid, highlighting that further interactions between melamine and its degradation products should be carefully evaluated.

Aims: Consequently this project aimed at screening for interactive toxicity between melamine and cyanuric acid using a cell culture model.

Methods: The basic approach of the analysis was to compare the observed responses at mixture points of interest with the response at individual level. If significant departure from the individual cytotoxicity was found, then an interaction can be claimed at the mixture levels tested.

Results: Our results show that there were no additive or synergistic interactions between melamine and cyanuric acid when mixed at a ratio of 1:1, 10:1, 100:1 and 1000:1. Melamine generally appeared to reduce the harmful acidic effects induced by cyanuric acid and antagonism may be displayed in Madin-Darby canine kidney (MDCK) cells. Additionally, the short and long term implications of exposure to melamine and its degradation products in utero and during early stages of life (from birth until reaching sexual maturity) were also investigated. We did not observe any stone formation following melamine feeding even at doses exceeded the anticipated human exposure in the kidney stone mouse model. Additionally, there was a significant weight loss together with an elevated blood urea and creatinine in animals with kidney stones that were formed following cyanuric acid/melamine mixture feeding. This is a clear indication of acute kidney damage. The minimum dose required to induce the formation of kidney stones was a mixture of 400 mg melamine and 10 mg cyanuric acid. We have also evaluated the effect of a mixture of melamine/cyanuric acid on embryo development and our preliminary data suggested that in pregnant mice with acute kidney stone there was a significant increase in embryonic death and deformities.

Implications: Data from this study will provide a greater understanding of potential Kidney and developmental toxicity of melamine which is important for a comprehensive risk assessment process. As some of children in Hong Kong who have received the melamine milk are still under medical surveillance, understanding the long-term outcome in animal model will be a good indication for the future interventions for these patients. Our data from the kidney stone mouse model indicated the cyanuric acid alone is a key element in stone formation.

Ref. No. MI-BS-16

Ab150
Unintentional home injury in Hong Kong: a cross-sectional epidemiology study of the risk factors and public health implication of non-fatal unintentional home injury

EYY Chan, JH Kim, J Leung, C Suen, P Yung, SM Griffiths
School of Public Health and Primary Care, CUHK

Background: Non-fatal unintentional injuries represent 10% of mortality worldwide and are the leading cause of death among young people. Nevertheless, limited is known related to the epidemiology of injury related morbidities and help-seeking behaviour post injury.

Aims: This study investigates the epidemiological characteristics of non-fatal unintentional household injuries in Hong Kong, a city with one of the world's highest population densities.

Methods: A population-based, cross-sectional, random telephone survey was conducted between April and June 2009 with a modified Chinese WHO injury and violence survey questionnaire. 6,570 non-institutionalized Cantonese-speaking Hong Kong residents were sampled. Descriptive, univariate, and multivariate analyses were conducted to highlight associated risk and protective factors and identify help-seeking behaviour patterns.

Results: Self-reported non-fatal unintentional home injuries was 39.42 % (n=2,590) in the previous 12 months. Contusion/crushing injuries, burn-related scalds, and open wounds were the three most commonly reported home injuries. Extremities (arms and thighs) were the main body parts injured. Female gender, age 40-55, and senior secondary education level were associated with a higher likelihood of injuries. Living Room (50.88%) and bedroom (18.15%) were the

most common locations for contusions/crushing while kitchen was for burn-related scalds (88.19%) and open wounds (65.93%). Among injured individuals, only 4% sought medical care and help-seeking predictors included people aged >40, divorced/separated, and with chronic disease.

Conclusions: This is the first comprehensive epidemiological study of non-fatal unintentional household injuries in a high-density Asian city. Socio-demographic, environmental, and setting-based risk and protective factors, help and health seeking pattern associated with unintentional household injury were identified.

Implications: Injury prevention interventions should target on the high risk groups to reduce the burden of non-fatal unintentional injury at home in urban settings.

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Ab259
Nurse-led triage analgesic for painful limb conditions to reduce the pain for those non-emergency patients

CHL Tsoi, YM Ho
Accident and Emergency Department, NDH

Background: Nurse-led triage analgesic has been pioneered by several hospitals in Hong Kong with variable success. Due to service demand, this was introduced in May 2010 in the form of a departmental guideline.

Methods: This is a retrospective study by reviewing the medical charts before and after the analgesic.

Results: In May and June 2010, the triage nurse inquired 336 subjects who presented with a painful condition whether they wanted to take analgesic while waiting to be seen. One hundred and twenty (36%) subjects accepted. Males were slightly more likely to take the drug than females (39% vs 30%, p=0.097) although the difference was not statistically significant. The pre-drug pain score was higher compared with the post-drug score (7.2/10 vs 5.4/10; p<0.05). Review of the raw data showed the response rate was low; only 9.8% and 13.7% of the subjects completed the pre- and post-pain score.

Conclusions: A nurse-led triage analgesic protocol to reduce pain for patients waiting to be seen by a doctor was reviewed to assess its effectiveness. There was almost a 2-point drop in the pain score which was statistical significant.

Implications: Triage, apart from sorting the patients into different categories, can also initiate treatment to alleviate pain and suffering. Departmental policy on nurse-led analgesic programme could have an impact on the quality of care.

Ab10
The epidemiology and natural history of depressive disorders in primary care

WY Chin[1], CLK Lam[1], SSY Wong[2], YYC Lo[1], DYT Fong[3], DTP Lam[1]
PWH Lee[4], JWSG Wong[4], BCF Chiu[5]
[1]Family Medicine Unit, HKU
[2]School of Public Health, CUHK
[3]School of Nursing, HKU
[4]Department Psychiatry, HKU
[5]HKSH

Background: Depressive disorders are commonly managed in primary care and primary care clinicians are ideally placed to serve as central providers to these patients. Around the world, the prevalence of depressive disorders in patients presenting to primary care is between 10-20%, of which around 50% remain undiagnosed. In Hong Kong, many barriers exist preventing the optimal treatment and management of patients with depressive disorders. The pathways of care, the long term outcomes and the factors affecting prognosis of these patients requires closer examination.

Aims: We aim to examine the prevalence, incidence and natural history of depressive disorders in primary care and the factors influencing diagnosis, management and outcomes using a cross-sectional study followed by a longitudinal cohort study.

Methods: Doctors working in primary care settings across Hong Kong will be invited to this study. On one day each month over twelve months, eligible patients will be invited to complete a questionnaire containing questions on socio-demography, co-morbidity, family history, previous doctor-diagnosed mental illness, recent mental and other health care utilization, and PHQ-9, CES-D 20 and SF-12v2. Doctors will be asked to document details regarding presenting problem, whether the patient has a mental illness, whether a new or old clinical diagnosis of depression was made, and duration of illness. If the doctor detects a depressive disorder, further data will be collected regarding how that diagnosis was made and patient management. Patients who consent will be followed up by telephone at 2, 12, 26 and 52 weeks.

Results: The results will provide information regarding prevalence, 12-month incidence, remission rate, outcomes and factors affecting outcomes of patients with depressive disorders in primary care.

Conclusions: The epidemiology, outcomes, predictors for prognosis and service needs for primary care patients with depressive disorders will be identified which will be useful for policy and service planning.

Ref. No. SMH-27

Ab37
A 10-year outcome study of an early intervention programme for psychosis in Hong Kong (EASY) compare with standard care service

KW Chan[1], EYH Chen[1], JYM Tang[1], MML Lam[1], CPY Chiu[1],
ELW Dunn[2], DWS Chung[3], KC Yip[4], S Tso[5], SF Hung[6]
[1]Department of Psychiatry, HKU
[2]Department of Psychiatry, PYNEH
[3]Department of Psychiatry, TPH
[4]Department of Psychiatry, KH
[5]Department of Psychiatry, CPH
[6]Department of Psychiatry, KCH

Background: Psychosis such as schizophrenia is related to great stress and is a burden to society. Previous studies have shown that intervening psychosis at earlier stage can secure a better outcome. In 2001, the Hong Kong Hospital Authority launched the Early Assessment Service for Young People with Psychosis (EASY) programme targeting the age group 15 to 25, aim at improving outcome by facilitating of early detection and offering more comprehensive intervention at the early stage of the illness. Internationally, different short term to intermediate term (one to five years) comparison outcome studies have demonstrated that patients with psychosis receiving early intervention service generally achieve better outcome in symptom control and functioning. Locally, our team completed a matched controlled study, and found that patients receiving early intervention (EI) service for 2 years have better

outcome including much reduced hospitalisations, reduced completed suicides and improved functioning at 3-year follow up compare with standard care (SC) service based on case notes review. However, there is limited evidence on controlled comparison of longer term (decade or more) outcome of the early intervention and standard service both internationally and locally. Based on our earlier case controlled 3-year outcome study, we will investigate the 10 year long-term outcome in a subset of the subjects with diagnoses of schizophrenia and related disorders comparing the two service models. This study is fully funded by the Food and Health Bureau of the Hong Kong Government and started in June 2010.

Methods: Structured face-to-face interview of these two cohorts will be conducted to evaluate outcome in several aspects including symptom, functioning, treatment complications, hospitalisation, quality of life and direct cost at 10 years of their initial contact with the mental health service. We expect to recruit 105 patients for each cohort. Other information will be obtained by medical record review and phone contact.

Knowledge Gain: This helps to inform us the illness progression and hence improve our understanding of this illness and compares the difference of long term outcomes of patients receiving two different services: Standard Care and Early Intervention Service.

Implications: The results of this study are of vital importance in clarifying the long-term effectiveness of this recently developed community programme (EI) locally. This will also serve as important evidence in guiding future service planning and development in mental health service in Hong Kong.

Ref.No. SMH-28

Ab42
A prospective cohort study on perceived stigmatisation of patients with mental illness and its psychosocial correlates

WT Chien, SWC Chan, FKK Yeung, HFK Chiu, FL Yuen
School of Nursing, PolyU

Background: Stigma is defined as the social devaluation of a person because of a personal attribute, leading to the experience of a sense of shame, disgrace and social isolation. This biased attribution of misbehaviour and disgrace to people with mental illness represents a stereotype of mental illness, in which the negative characteristics of some patients with mental illness such as violence are over-generalised to all those who have mental illness. Yet, there are limited studies have been carried out on the process of labeling and stigmatisation, particularly from the perspectives and experiences of these patients and the systematic assessments of the experiences of these patients in different cultural context in various parts of the world.

Aims: This study aimed to explore the levels and experiences of social stigmatisation perceived by patients with severe mental illness in the community and their psychosocial health conditions at a 12-month interval.

Methods: A longitudinal descriptive survey study design will be adopted. Study subjects will complete the questionnaires twice at nine-month interval. Selected patients, caregivers and staff will participate in one focus group interview. Using validated measurement scales for primary outcomes: the patients' perceived discrimination and devaluation, level of functioning, self-esteem, mental state, and illness relapse over 12-month; and *secondary outcomes*: patients' self-efficacy and socio-demographic and clinical data; families' level of expressed emotion and burden, and health professionals' attitudes towards patients with mental illness. Six *focus group interviews* (one patient, one caregiver and one health professional focus group for each setting) - to understand how the patients, family caregivers and health professionals perceive about the contributing factors, process and consequences of stigmatisation.

Results: Results of the pilot study in 20 patients, their family caregivers and 5 health professionals in one study setting indicated that patients' perceived stigmatisation and health professionals' stereotype and restriction scores were in moderate levels (mean, s.d.= 35, 4.2 for

social rejection [possible range=11-55]; 30, 5.1 for secrecy and withdrawal [possible range=8-40]; 2.8, 0.9 for stereotypes [possible range=1-5]; and 2.7, 1.0 for restriction [possible range=1-4]). Correlates of patients' perceived stigmatisation were found to be: self-esteem (Pearson r= -0.56, p=0.005), caregiving burden (r=0.50, p=0.009), symptom severity (r=0.60, p=0.003), service utilisation (r= -0.45, p=0.010), and re-hospitalisation rate (r=0.60, p=0.0003). Professionals' stereotype and restriction scores were also associated with patients' service utilisation (r=0.46, p=0.005), daily functioning (r=0.55, p=0.001), self-efficacy (r=0.48, p=0.008), and families' expressed emotion (r=0.50, p=0.0007).

Implications: Assessment of perceived stigmatisation and psychosocial health conditions of patients with severe mental illness in Hong Kong, and their influencing factors, would provide important information that may be missed by current mental health services in both secondary and tertiary levels of care.

Ref No. SMH-34

Ab55
Mental health enhancement: cognitive training for Hong Kong Chinese persons with schizophrenia in vocational rehabilitation

DWK Man[1], CKM Law[2], RCK Chung[1], WCW Chan[2], IWP Chan[2]
[1]Department of Rehabilitation Sciences, PolyU
[2]Occupational Therapy Department, CPH

Background: Impairment in work function is a characteristic of people with schizophrenia despite their desire to work. To date, significant predicators of vocational outcomes include patients' cognitive functions.

Aims: This study adopted a randomised controlled trial design in studying the effectiveness of a computerised, errorless learning-based, training programme to enhance schizophrenic patients' cognitive functions and vocational outcomes.

Results: A total of 80 participants with schizophrenia, recruited from Castle Peak Hospital, were randomly assigned to a computer-assisted errorless-learning group (CAELG), a therapist-administered group (TAG) and a control group (CG). Except for the CG, the participants in the training groups received respectively two similar 4-week, individualised convenient shopkeeper training programmes. They were similar in content and structure by using an errorless-learning approach, but different in the delivery modes. Assessment would be carried during pre-, post-test and 3-month follow up period. Outcome measures of cognitive, emotional and vocational outcomes include Vocational Cognitive Rating Scale (VCRS), Wisconsin Card Sorting Test Computer Version 4 – research edition (WCST-CV4), Neurobehavioral Cognitive Status Examination – Chinese Version (NCSE-CV), Chinese Work Personality Profile (CWPP), self efficacy scale (SES), and Positive and Negative Affect Scale – Chinese Version (PANAS-CV). Participants in CAELG and TAG were found to perform better than CG in NCSE scores. CAELG had also shown better self-efficacy (social skills and personal appearance) in work training and positive affect than CG. No similar effectiveness was found in TAG. Work status after training would be best predicted by a cognitive (WCST, NCSE) and an emotional factor (self-efficacy, PANAS).

Discussion: A combined use of an errorless learning and a computerised approach may be effective in enhancing the cognitive functioning for Chinese persons with schizophrenia and thus their vocational outcome. Findings of this study could contribute both theoretically and clinically. Theoretically, many existing approaches/framework are available for cognitive remediation on schizophrenic patients, however, we believed that through the study, we now obtained evidence of a more reliable and effective training approach for better vocational outcomes, mental health and recovery of schizophrenic patients. Clinically, through examining the new vocational outcome predictors of cognition (specifically reasoning and problem-solving), the vocational rehabilitation treatment programme design for schizophrenic patient in future will be more specific and tailor-made to such kind of patient type. Through developing a standardised computer assisted cognitive training programme, training provided for schizophrenic patients in future will be more systematic, standardised and comprehensive to cater for their needs. Further study is suggested to improve the program design, content and visual effects to boost the work training programme's effectiveness.

Ref. No. HHSRF: 05060231

Ab59
Community case management for early psychosis: is two year an optimal duration? A randomised controlled study

EYH Chen, MML Lam, SKW Chan, SF Hung, KK Chung, ELW Dunn, DWS Chung, S Tso, CLM Hui, WS Au Yang, KW Shun, JYM Tang, GHY Wong
Department of Psychiatry, HKU

Background: Psychotic disorders (including schizophrenia) rank amongst the top ten diseases with the highest global disease burdens and inflict profound impacts on communication, personality and social behaviour of the individual, resulting in long-term functional disability. Effective management involves specialised, focused, and well integrated pharmacological and psychosocial interventions

Aims: We propose a randomised controlled study to investigate the effectiveness of providing community based case management for an additional year for patients with psychotic disorders. We hypothesis better outcome in terms of social and occupational functioning, symptoms, and quality of life in patients who had 3-year case management compared with those who had only 2 years.

Methods: Patients will be recruited from the integrated Early Assessment Service for Young people with psychosis (EASY) in Hong Kong which provides specialised intervention service to first-episode psychosis patients. This is a prospective, open-labeled, randomised controlled trial of early intervention. Patients who completed 2 years of early intervention will be randomised into either an additional 1 year of case management, or no case management (standard care). Assessments on basic demographics, clinical and psychosocial aspects are to be made at baseline (i.e., after the second year of case management) and then after the third year with case management intervention or standard care. In the case management group, a trained case manager will provide intensive care to the patient, which includes psychoeducation, continuous contact and supportive engagement with patients and their families.

Ref No. SMH-29

Ab64
REM sleep behaviour disorder and psychiatry: a hidden but potentially serious condition. A case-control study

YK Wing[1], SP Lam[2], JMY Tsoh[2], VCT Mok[3]
[1]Department of Psychiatry, CUHK, [2]Department of Psychiatry, SH
[3]Department of Medicine and Therapeutics, CUHK

Background: Rapid-eye-movement (REM) sleep behaviour disorder (RBD) is a sleep disorder characterised by enactment of violent dreams during sleep with loss of normal REM muscle atonia. Patients present with sleep-related movement such as kicking, punching and sleep-related injuries to self and bed-partners during sleep. RBD usually affects elderly male and the prevalence is 0.38% in Hong Kong elderly populations. There is accumulating evidence that RBD is a neurodegenerative disease as it precedes synucleiopathy, such as Parkinson's disease and dementia of Lewy Body. Early neurological markers such as olfactory dysfunction have been reported among idiopathic RBD subjects without clinical presentation of neurodegenerative diseases. Hence, a spectrum of neurodegenerative processes from early subclinical neurological deficit to RBD and full blown neurodegenerative diseases exists.

Aims: To further understand this condition, we planned a case-control study, aimed at 1) establishing the objective evidence of this condition by polysomnography, 2) looking for any early neurodegenerative signs.

Methods: Two control groups were selected: one from psychiatric clinic and the other group was selected from general population. All cases and control subjects undergo measurements, including self-reported questionnaires, clinical interviews, overnight polysomnography, neuro-cognitive tests and neurological examinations.

Results: The study was initiated in October 2009. Over the past 8 months, we have successfully recruited 47 cases and 25 controls. The preliminary results suggested that patients with RBD showed abnormality in polysomnography in terms of more REM related muscle activities and loss of REM atonia. They also had more clinical manifestation of neurological symptoms of essential tremor. Detailed neuro-cognitive tests between the case and control groups did not revealed significant

differences but the RBD subjects were more likely to have olfactory dysfunction, which is an early marker for neurodegenerative diseases, as seen in the typical RBD group.

Conclusions: This preliminary result suggested that RBD exists in psychiatric population at a younger age of onset than the general population. The presence of olfactory dysfunction in this atypical RBD subjects may suggest that the disease has neurodegenerative component, and hence account for the personal vulnerabilities. Further analysis would provide more confirmatory findings as the study continued.

Ref. No. HHSRF: 07080011

Ab68
The association between obesity and psychosocial health in Hong Kong children

SPP Tin[1], SY Ho[1], KH Mak[2], KL Wan[2], TH Lam[1]
[1]School of Public Health, HKU
[2]Student Health Service, DH

Aims: To investigate the association between childhood obesity and psychosocial health in Hong Kong

Methods: A cohort of 113 457 primary 4 (P4) participants (aged 8-12) of the Student Health Service in 1998-2000 were tracked, with 69 045 (60.9%) available for analysis in primary 6 (P6). Traced and untraced subjects had similar characteristics. The self-esteem (psychosocial health indicator) of primary school students was assessed using the Culture-Free Self-Esteem inventories for Children (SEI) at both time points. Children who scored 'very low' on any of the 4 subscales or had a total score ≤19 were at high psychosocial risk. Weight status was classified according to the International Obesity Task Force standards. Using baseline weight status and self-esteem as predictors, logistic regression yielded odds ratios (ORs) for psychosocial risk and becoming overweight/obese at P6, respectively. The analyses were adjusted for sex, baseline age, socioeconomic status, health behaviour, pubertal stage and baseline SEI score or weight status, where appropriate.

Results: Among normal weight P4 children, those who had lower (poorer) SEI total/subscale scores were more likely to become overweight/obese in P6 (p<0.01). Specifically, children at high overall psychosocial risk were 32% (OR 1.32, 95% CI 1.11 to 1.59) more likely to become overweight/obese. Excluding children with positive psychosocial risk at baseline, overweight/obese P4 children had a higher risk of acquiring low/very low SEI total and various subscale scores at P6 (all p for trend <0.001). Specifically, overweight or obese P4 children were 16% (OR 1.16, 95% CI 1.06 to 1.28) and 44% (1.44, 1.23 to 1.69) more likely to develop high overall psychosocial risk in P6, respectively. Obese P4 girls were apparently more likely to be at psychosocial risk in P6 (OR 1.78, 95% CI 1.35 to 2.36) than obese boys (OR 1.31, 95% CI 1.07 to 1.59), although the difference was insignificant (p for interaction=0.50).

Conclusions: We found a bi-directional relationship between self-esteem and overweight/obesity. Low self-esteem may lead to overweight/obesity among normal weight children. Thus, improving self-esteem may be beneficial for weight control. On the other hand, overweight and obese children had a stronger tendency to develop poor self-esteem. Therefore, prevention of childhood obesity and early education to improve body satisfaction may reduce future psychosocial problems among obese children

Ref. No. HHSRF: 05060781

Ab73
Evaluation of a model of violence risk assessment (HCR-20) among adult patients discharged from a gazetted psychiatric hospital in Hong Kong

RMY Ho, HHK Cheung, TTS Lai, VFL Tam, AWL Chan, CK Yan, PKY Kwok
CPH

Background: In Hong Kong, a clinical model of violence risk assessment has been employed, i.e. the Priority Follow-up (PFU) System. However, there is little research evidence to suggest that clinical approach to violence risk assessment is accurate, consistent, or

useful. Structured professional judgement (SPJ) has been proposed as a practical approach that attempts to bridge the gap between actuarial approach and the clinical practice of risk assessment. The Historical/Clinical/Risk Management – 20 items (HCR-20) is the SPJ tool that most research has been published on. This has not been validated in Hong Kong or predominantly Chinese population.

Aims: To test the inter-rater reliability and the predictive validity of the HCR-20 tool, and also to compare the predictive validity between PFU system and the HCR-20 tool.

Methods: A prospective cohort design. The HCR-20 will be completed by trained raters for approximately 100 discharged patients from a gazetted hospital with a PFU status and also for the same number of demographically-matched controls. Violence, as defined by the HCR-20 manual, will be determined from multiple file-based sources at 6- and 12-month after the HCR-20 rating. Interclass correlations (ICC) will be used for reliability analyses. The predictive validity for HCR-20 items, scales, and structured final risk judgement as well as for PFU status will be established with receiver operating characteristic (ROC) analysis. The AUC for HCR-20 tool will be directly compared with the AUC for PFU status to assess whether there are any significant statistical differences.

Implications: Although violence risk assessment is necessary, it is the management of risk which is most essential. The current PFU system does not guide any risk management of the patients after they have been identified as violent. HCR-20 tool not only assesses risk but also emphasises and helps the development of individualised risk management strategies.

Ref No: SMH-45

Ab97
The effectiveness of therapeutic play on pre- and post-operative anxiety and motional responses of Hong Kong Chinese children having elective surgery: a randomised controlled trial

HCW Li
School of Nursing, HKU

Background: It has been well-documented that surgery, in particular the procedure of preparing for anaesthesia, can be a very stressful experience for children. Excessive anxiety and stress can affect children's physical and mental health, hinder their ability to cope with surgery, and may also inhibit their postoperative recovery. During the past decade, there has been an increase in the use of therapeutic play intervention to help children cope with the stress of hospitalization. However, the majority of these studies are based on theories and clinical observations; the effectiveness of using therapeutic play in the preparation of children for surgery has seldom been tested. Given these issues, there is an imperative need for more rigorous empirical scrutiny of the effectiveness of therapeutic play intervention in preparing children for surgery.

Aims: To examine the effectiveness of therapeutic play intervention in preparing children undergoing surgery.

Methods: A randomised controlled trial, two-group pre-test and repeated post-test, between subjects design was employed. Two hundred and three Hong Kong Chinese children (age 7 - 12 years) admitted for elective day surgery during a 13-month period, were invited to participate in the study. By using a simple complete randomisation method, 97 children were assigned to the experimental group receiving therapeutic play intervention and 106 children were assigned to the control group receiving routine information intervention.

Results: The results showed that children in the experimental group reported statistically significant lower state anxiety scores in both pre- and post-operative periods. In addition, children in the experimental group exhibited fewer instances of negative emotions than children in the control group.

Conclusions: The study has addressed a literature gap in the literature by systematically researching the effectiveness of therapeutic play on outcomes of children having elective surgery. The results of the study provide empirical evidence of the effectiveness of therapeutic play in preparing school-age children for day surgery.

Implications: The findings heighten the awareness of the importance of integrating therapeutic play as essential components of holistic and

quality nursing care to prepare children for surgery. It is anticipatedthat the information derived from this study can be used to inform the Hospital Authority that, if the entire hospital organisation is committed to giving quality service, incorporating therapeutic play into routine preoperative nursing preparation for children is one way for nurses to meet this objective.

Ab101
Randomised controlled trial of the self-stigma reduction programme among individuals with schizophrenia

HWH Tsang, KMT Fung
Department of Rehabilitation Science, PolyU

Background: Research evidence suggests that individuals with schizophrenia are prone to self-stigmatisation which reduces their psychosocial treatment compliance. A self-stigma reduction programme was developed based on a theoretical framework proposed by our team. The effectiveness of such programme to reduce self-stigma, enhance readiness for change, and promote compliant behaviours among individuals with schizophrenia was investigated.

Methods: This programme consisted of 12 group and four individual follow-ups sessions. An integrative approach including psychoeductaion, cognitive behavioral therapy, motivational interviewing, social skills training, and goal attainment programme was adopted. Between October 2008 and December 2009, sixty-six self-stigmatised individuals with schizophrenia were recruited. They were randomly allocated to the self-stigma reduction programme ($N= 34$; experimental protocol) or the newspaper reading group ($N=32$; comparison protocol). Measures on participants' level of self-stigma, readiness for change, insight, general self-efficacy, and treatment compliance were taken for six assessment intervals.

Results: The findings suggested that the self-stigma reduction programme promoted the readiness for changing own problematic behaviours and reduced self-stigmatisation.

Conclusions: The therapeutic effects were however not long lasting. Recommendations for further improving the effectiveness of self-stigma reduction programme are suggested.

Ab102
A three-year follow-up study of an integrated supported employment for individuals with severe mental illness

HWH Tsang[1], KMT Fung[1], AY Leung[1], SMY Li[1], WM Cheung[2]
[1]Department of Rehabilitation Science, PolyU
[2]Faculty of Education, HKU

Aims: This study examined and compared the long-term effectiveness of the Integrated Supported Employment (ISE) programme, which consists of Individual Placement and Support (IPS) and Work-related Social Skills Training (WSST), with the Individual Placement and Support (IPS) programme on the vocational and non-vocational outcomes among individuals with severe mental illness (SMI) over a period of three years.

Method: One hundred and eighty-nine participants with SMI were recruited from two non-government organisations and three day hospitals in Hong Kong and randomly assigned into the ISE ($n= 58$), IPS ($n=65$) and Traditional Vocational Rehabilitation (TVR) ($n=66$) groups. Vocational and non-vocational outcomes of the ISE and IPS participants were collected by a blind and independent assessor at 7, 11, 15, 21, 27, 33 and 39 months after their admission, whereas the TVR groups were only assessed up to 15th month follow-up.

Results: After 39 months of service provision, ISE participants obtained higher employment rate (82.8% vs 61.5%) and longer job tenure (46.94 weeks vs 36.17 weeks) than the IPS participants. Only 6.1% of TVR participants were able to obtain employment before the 15th month follow-up. Fewer interpersonal conflicts at the workplace were reported for the ISE participants. Advantages of the ISE participants over IPS participants on non-vocational outcomes were not conclusive.

Conclusions: The long-term effectiveness of the ISE programme in enhancing employment rates and job tenures among individuals with SMI was demonstrated by this randomised controlled trial.

Ab124
An evaluation of post-triage nurse-led clinic for clients with mental health problems newly referred to psychiatric outpatient clinic

WT Chien[1], CSK Chu[2], SF Leung[1]
[1]School of Nursing, PolyU
[2]UCH

Background: In Hong Kong, psychiatric advanced practice nurses have been challenged with the task of reducing waiting times so that clients with more urgent symptoms can receive timely mental health education and intervention. A structured one-to-one early psychiatric and psychosocial intervention programme has been piloted in a few outpatient clinics in Hong Kong. Measures of clinical outcome are now necessary to more accurately demonstrate its long-term effects.

Methods: A randomised controlled trial with repeated-measures two-group design will be used to determine the effect of the Psycho-education programme run by an advanced practice psychiatric nurse when compared with usual outpatient care as controls. Newly referred psychiatric patients (Category 2 at triage) at one regional psychiatric OPD in the Kowloon East Cluster of Hospital Authority. Ninety-six patients will be randomly selected according to the sequence of OPD referrals. They will then be randomly assigned to the treatment or control group, using computer allocated random numbers in blind sealed envelopes. The dependent variable (clinical effectiveness) will be measured by pre-test and post-testing Process evaluation of the psycho-education programme will be conducted with semi-structured interviews. Data will be analysed to test three sets of hypotheses related to the following measures at recruitment, immediate and six months after the intervention: Mental and psychosocial conditions, including mental status, anxiety state, insight and treatment attitude, and self-efficacy in life situations; Perceived quality of life and satisfaction with mental health services receiving; and Rate of hospitalisation and default follow-up in the OPD. Repeated-measures multivariate analysis of variance test will be used to test any differences on these patient variables between the treatment and control group over time, followed by post hoc comparisons among those found significant result. Semi-structured interviews and audio-taped sessions will give qualitative data on patients' perceptions of the benefits and limitations of the nurse-led programme and its therapeutic components, respectively.

Knowledge gains: Results of Mann-Whitney U-test indicated that the participants in the nurse-led psycho-education programme reported significantly improvements on their perceived quality of life and satisfaction with mental health services and lower hospitalisation rate at post-test (one week after the intervention). Qualitative evaluation results of the pilot study indicated that most of participants in the nurse-led programme appreciated and perceived much benefit from the knowledge and skills learned from the programme and the advanced practice nurses, especially sleep hygiene, medication management, and illness symptoms and behaviours.

Implications: The results of this project will identify the clinical effectiveness of a psycho-education programme in a newly established nurse-led clinic of the HA and provide information on how this would help newly referred clients with mental health problems to understand and cope better with their symptoms and problems in functioning and daily living. The results will also inform mental health professionals of empirical evidence on a model of early intervention for Hong Kong Chinese patients at their first contact with the community mental health service as outpatients.

Ab144
Mental health problems in community: a study of the pathway to care in Hong Kong

WC Chan[1], PPL Chow[1], LCW Lam[2], SF Hung[3], EFC Cheung[1], KC Yip[4], ELW Dunn[5], JCK Fu[1]
[1]CPH, [2]CUHK, [3]KCH, [4]KH, [5]PYNEH

Background: Mental disorders are highly prevalent health conditions and associated with significant disability. With the advancement

of medical science, effective treatments for mental disorders are now widely available. Despite this, mental health problems have remained under-recognised and inadequately treated. As estimated by the World Health Organization (WHO) World Mental Health Survey Initiative, up to 50.3% of persons with serious mental disorders in developed countries and 85.3% in less developed countries receive no psychiatric treatment. Early intervention of mental health problems is important because it can effectively reduce the risk of relapse and suicide, inpatient treatment and medication use, disruption to family and employment / development, and cost of treatment. It is therefore necessary to understand the help seeking behaviours of persons with mental disorders, and identify the obstacles that delay their acquisition of psychiatric care at primary or specialist service setting.

Aims: The current study is the first territory-wide research to examine the help seeking behaviours adopted by the local population with mental health problems in Hong Kong. We aim to examine the pathway to care taken by the local population with mental health problems, elucidate the factors that delay or speed up help-seeking behaviours, and above all, frame recommendation on planning of mental health care.

Methods: Adult patients presenting for the first time to psychiatric services in five clusters of Hospital Authority will be recruited: New Territories West, New Territories East, Kowloon West, Kowloon Central and Hong Kong East. Participants of the study will be evaluated with WHO Encounter Form, Health of the Nation Outcome Scale, Social Support Rating Scale, and Cumulative Illness Rating Scale. One of the most established ways to look into this area is by means of a pathway study, which systemically records the chronological details and sources of care received by an individual before reaching mental healthcare services. Such information provides valuable clues to the effects of different levels of filters on the pathways to care, as well as the relationship between delays in help seeking and the clinical and demographic factors of the persons with mental health problems.

Ref No. SMH-44

Ab164
Is Assertive Community Treatment an effective intervention for frequent readmissions to psychiatric hospital?

CC Lee, SK Liem, CW Wong, WY Tse, J Leung, K Wong, SK Yuen, WL Lee, WL Lo, NH Yip, WF Lee
KCH

Background: Many community mental health projects in Hong Kong are using the intensive case management and Assertive Community Treatment (ACT) models of care for their patients. But a dearth of local evidence-based studies limited their. We identified a group of psychiatric patients who seek readmissions to hospitals frequently (IFR), and resources from new RAE were sought to provide these patients with ACT with a hope to reduce the readmission rate and LOS. This study will evaluate the impact of ACT, against 2 historical control groups who received conventional community and rehabilitation treatment only.

Aims: To compare clinical and administrative outcomes of the ACT in IFR programme with that of the conventional psychiatric intervention programme for severe mentally ill (SMI) patients with repeated psychiatric hospitalisation living in Hong Kong.

Methods: All patients with 3 or more admissions during the preceding 12-month period will be recruited as subjects in treatment group. The control subjects are two groups of ACT-naïve patients who had frequent admission in the 12 months prior to, and after, the recruitment period of the treatment group subjects. The ACT team will provide frequent case work to the subjects, family and liaison work to A&E department. There were frequent meetings amongst the case managers (CM) and supervisors to ensure quality care. The CM could be contacted by their respective subjects and the AED staff through telephone at any time of the day. Readmissions, bed day occupancy, A&E attendances and other administrative data will are retrieved from CDARS, BPRS, SLOF and WHOQOL are measured at 6 monthly intervals for 18 months after recruitment, data from pre and post intervention were compared.

Results: A total of 85 subjects were recruited in the treatment group. The initial result is encouraging. The readmission dropped from a total of 302 to 37 episodes, and LOS dropped from 11,073 to 3,338 bed days, in the past 12 months. The full impact of the intervention will be revealed after recruitment of all the control group subjects and the data analysed and compared.

Implications: The present study will inform the clinicians and mental health service planners on the nature and magnitude of impact of the ACT model of care for a subgroup of SMI patients, the frequent readmitters.

Ref No: SMH-39

Ab166
Identifying relationship among perceived stress, stress symptoms and related risk factors among expectant fathers during transition to fatherhood using the threat appraisal model

WK Yee[1], AM. Lee[1], CP Lee[2], KY Leung[3], CY Chan[1], CSK Tang[4], KF Chung[1]
[1]Department of Psychiatry, HKU
[2]Department of Obstetrics and Gynaecology, HKU
[3]Department of Obstetrics and Gynaecology, QMH
[4]Department of Psychology, National, University of Singapore, Singapore

Background: Mental health problems among expectant fathers are an area that is under-researched. Preliminary findings showed that depression affected 4.8-5.3% of fathers in the antenatal period. Pregnancy is a potential stressor and could be regarded as a threat for expectant fathers' well-being as it requires substantial lifestyle and psychological readjustment. It is reasonable to understand expectant fathers' stress experience using the threat appraisal model.

Aims: The present study attempted to use this model to identify potential risk factors for expectant fathers' stress experience.

Methods: Thirty-one expectant fathers were interviewed to examine their stress experience and stress symptoms during their partners' pregnancy, as well as factors that predispose or protect them from stress. Interviews were transcribed. The threat appraisal model was used as the guiding theory to understand expectant fathers' stress experience. Content analysis was conducted to code the various risk and protective factors as with respect to the different components of the model.

Results: Unplanned pregnancy; negative impact of pregnancy on expectant fathers' life; and partners' health condition and complications were identified as factors that increased perceived probability of threat. Financial burden; time cost; and conflict between work and family constituted perceived cost. Self-efficacy was identified as a variable that strengthen perceived ability to cope. Finally, perceived social support was identified as a perceived rescue factor. Relationships between the different components and perceived stress and stress symptoms were analysed to identify salient risk and protective factors of stress.

Conclusions: A significant proportion of expectant fathers in Hong Kong are under stress (61.3%) and reported stress symptoms (58.1%), including psychological distress (depressed mood, anxiety, loss of control, irritability and worry) and psychosomatic symptoms (fatigue and sleeping problem). Analysis of the relationship between the various factors in the model and perceived stress and stress symptoms suggested that partners' physical complications, cost of time and finance, lack of self-efficacy and perceived social support are related to perceived stress, while partners' mental health problems, impact of pregnancy in life and work family conflict are related to stress symptoms. Unplanned pregnancy could predict both perceived stress and stress symptoms. These findings point to the need to involve prenatal and postnatal paternal services into the health policies for the benefits of better family functioning and child development.

Results: From 1 Dec 2009 to 31 Mar 2010, 106 clients were recruited and randomised (IG 58, CG 48). Of these, 53 (IG 31, CG 22) completed Post-Study Assessment at the time of writing this abstract. A total of 1011 out-bound calls (17.4 per patient) and 13 in-bound calls (0.2 per patient) were made. Compared to CG, IG showed significant improvement on Quality of Life (p=0.03). Social Functioning and Life Skill of IG was numerically improved with mean score of SLOF increased from 187 to 192 and LSP-16 decreased from 9.4 to 8.0. Positive feedback from the Patient Satisfaction Survey was received from IG patients and their caregivers.

Conclusions: This study demonstrated that our new telephone support model is effective in facilitating efficient and effective case management post-discharge. The final data analysis is expected to have important implications for the future delivery of mental health service.

Ab197
Pathological internet use and associated factors among university students in Hong Kong

JH Kim, S Griffiths, CH Lau, YFB Fong, J Lam,
School of Public Health and Primary Care, CUHK

Aims: Despite the fact that Internet use is nearly ubiquitous among local university students, there are only a very limited number of local studies examining the potentially harmful health effects of internet use in this population. This study was conducted to determine the prevalence and incidence of Internet addiction and the associated socio-behavioral correlates among university students in Hong Kong.

Methods: In 2007, a cohort study was commenced on 1262 university matriculants in Hong Kong using self-administered questionnaires. Follow-up questionnaire-based surveys on these students were commenced in 2009.

Results: The study discovered a three-fold increase (5.0% to 15.7%) in pathological internet use (PIU) after 1.5 years of university studies. It showed a significant association between PIU and worse physical, mental, and social well-being. Students from Mainland China are particularly at risk of PIU. Most university students with PIU were not cognisant of their pathological internet use; moreover, only a small proportion of students with PIU were interested to seek help for their problem.

Conclusions: The study results support the contention that, with less parental control and greater internet accessibility, the prevalence of internet addiction increases among students after university enrolment. University health service workers should bear in mind that pathological internet use is a common health issue of university students that requires intervention. The topic should also be emphasised in primary and secondary school health education to increase the awareness.

Ref #: HHSRF 06070471

Ab204
Chronic psychosocial stress: does it modulate immunity to influenza vaccine in Hong Kong Chinese elderly?

SYS Wong[1], J Woo[2], FWK Chan[1], EMC Wong[1], RLP Wong[1],
CWK Lam[3], PKS Chan[4], K Ngai[4], S Mercer[1], CK Wong[3]
[1]School of Public Health and Primary Care, CUHK
[2]Department of Medicine and Therapeutics, CUHK
[3]Department of Chemical Pathology, CUHK
[4]Department of Microbiology, CUHK

Background: Previous studies evaluated the effects of psychosocial stress on influenza vaccine responses. However, there were methodological limitations.

Aims: To determine whether chronic stress is associated with poorer influenza specific immune responses to influenza vaccine in Hong Kong Chinese elderly.

Design: A prospective study with 12-week follow-up.

Setting: Subjects were recruited from government general out-patient clinics, non-government organisations and public housing estates in Hong Kong.

Ab189
A randomised controlled trial of a novel Telephone Nursing Support Service for psychiatric patients discharged from an acute psychiatric unit in Pamela Youde Nethersole Eastern Hospital

IPY Cheng, CK Kan, CWH Chan, TCP Ng, KW Shun, LYC Yam
PYNEH

Background: Telephone-based care management programmes are widely used in western countries. They have been shown to be well-accepted by psychiatric patients, improve treatment outcome and cost-effective in reducing hospital stay. To enhance existing community support for discharged psychiatric patients, a Telephone Nursing Support Service (TNSS) was started in PYNEH with no additional resources.

Aims: To evaluate the effectiveness of a Telephone Nursing Support Service (TNSS) operated by an acute psychiatric unit in educating and supporting patients and caregivers in detecting early relapse, seeking early intervention, reducing severe consequences such as violent behaviour or suicide and maintaining patients in the community.

Methods: A prospective randomised controlled trial was conducted in four acute psychiatric wards of PYNEH. Patients scheduled for discharge and with specific diagnoses (Depression, Bipolar Affective Disorder, Schizoform Disorder and Adjustment Disorder) were randomised into Intervention Group (IG) and Control Group (CG) after giving informed consent. Both groups receive Pre-Study Assessment before discharge and usual psychiatric care post-discharge but IG also received ≥7 sessions of telephone consultations from ward nurses before Post-Study Assessment at 12 weeks in the form of validated psychometric measurements through face-to-face interview by CPNS. Data on Patient Satisfaction Survey to TNSS will also be collected. Case doctors or community psychiatric nurses (CPN) were consulted if patient's mental state was found deteriorated during phone contact. IG patients were encouraged to call the ward for professional advice whenever required. The following data were collected at Pre-Study and Post-Study Assessment: number of out-bound and in-bound phone calls, SF-12 on quality of life, LSP-16 on life skills and SLOF on social functioning and compliance to clinic follow-up.

Participants: 55 caregivers of spouses with chronic conditions that impaired their activities of daily living and 61 age and sex matched non-caregivers.

Intervention: A single-dose trivalent influenza vaccine was given to all subjects by intramuscular ingestion.

Measurements: Blood samples were collected before vaccination, 6 weeks and 12 weeks after vaccination. Influenza vaccine strain-specific antibody titres were measured by the haemagglutination inhibition method. Lymphocyte subsets were analysed for ratios and absolute counts and cytokine concentration were measured by flow cytometry. Validated scales were used to assess psychological (depressive symptoms, perceived stress and caregiver strain), social (multidimensional social support scale) and lifestyle factors (physical activity, cigarette smoking and alcohol consumption) at baseline prior to vaccination. Demographic and socioeconomic variables were also collected. Albumin levels were measured as an indicator for nutritional status in subjects.

Results: Caregivers had statistically significant ($p<0.05$) lower cell-mediated immune responses to influenza vaccination at 12 weeks when compared to those of the controls. No differences in humoral immune response to vaccination were observed between caregivers and controls.

Conclusion: Chinese elderly who experience chronic stress have significantly lower cell-mediated immune response to influenza vaccination when compared to non-caregivers.

Ab258
CHEERS: enhancing awareness and wellness of the chronically ill and the community

ATF Hung[1], J Ho[1], SLE Chow[2], L Chow[2], FK Tsang[3], CL Lam[3]
KT Leung[1], SM Ng[4]
[1]The Hong Kong Society for Rehabilitation Community Rehabilitation Network
[2]NTWC
[3]HA

Background: People with chronic illness are a high risk group of depression. The World Health Organization (2003) states that the rate of major depression for stroke is 31%, epilepsy 30%, diabetes mellitus 27% and myocardial infarction 20%. Depression can have a significant and negative effect on morbidity, mortality and quality of life among patients. With the support of the Health Care and Promotion Fund, CRN and NTWC collaborated to pilot an innovative intervention model to promote the awareness and wellness of people with chronic illness and the community as a disease prevention and mental health project during the period from April 2007 to September 2008.

Aims: The project aims to address the mental health needs of people with chronic illness and their families in the New Territories West Cluster through
1) promoting awareness of mental health in patients and caregivers
2) alleviating stress of patients and caregivers
3) educating the community about the needs of patients and caregivers
4) raising the awareness of mental health needs of patients with professionals
5) establishing a hospital/ community collaborative model for patients and caregivers

Methods: The project is a hospital and community collaboration to address the mental health needs of people with chronic illness. Self-management, mutual support, networking and community education are the major approaches. Both professional and public awareness are also addressed. Group and community approaches to educational and psychosocial intervention are included.

Results: Large-scale educational talks were organised for patients and their families to understand the relationship of chronic illness and mental health issues, the signs and symptoms of anxiety and depression as well as available resources. Stress management workshops, cognitive behavioural therapy courses, stretching relaxation exercise classes and mutual support groups were provided to enhance the coping capacity of people with chronic illness in relation to mood issues. Professionals were equipped with educational resources for the awareness of mood problems among the patients. Community awareness was promoted through press conference and educational campaigns.

Implications: The project has enhanced the positive living, positive emotion and healthy lifestyle of people with chronic illness, as well as public awareness. The project has demonstrated the needs and strategies to address the mental health issues of people with chronic illness in a hospital-and-community collaboration. Prevention, early identification and early treatment are vital to the patients and their families. Public health approach with collaboration with different health and social service sectors will be important to tackle the needs concerned. The experience of the project can be applied to other clusters of the Hospital Authority.

Ab05
Association of human adenovirus-36 (Ad-36) with diabetes, adiposity and dyslipidaemia in Hong Kong Chinese

MMY Waye[1], MW Poon[1], KP Lim[1], L Zhang[1], R Ozaki[2], PCY Tong[2], RCW Ma[2], JCN Chan[2], PKS Chan[3]
[1]Croucher Laboratory for Human Genomics, School of Biomedical Sciences, CUHK
[2]Department of Medicine & Therapeutics, CUHK
[3]Department of Microbiology, CUHK

There is now a global epidemic of obesity and diabetes in both developed and developing countries, especially Asia. In Hong Kong, approximately one-third of adults are considered overweight (body mass index (BMI) =23 kg/m2) or obese (BMI=25 kg/m2). During the past decade, the percentage of Chinese men with central obesity in Hong Kong has doubled. According to the Hong Kong Student Health Service, between 1998-1999 and 2000-2001, some 139,732 children have turned obese. In 2003, in a community-wide school survey, 2-3% of our adolescents aged 11-18 have metabolic syndrome characterised by central obesity and clustering of risk factors. The rising trend of childhood obesity is of grave concern since this is the main driving force for young onset diabetes and that obesity is an independent predictor for cardiovascular risk factors, all-cause and cardiovascular mortality in Hong Kong Chinese. The pathogenesis of obesity is complex and multifactorial. Although drastic changes in lifestyle/dietary habits have been frequently implicated, there are several lines of evidence pointing to the possibility of an infectious cause for obesity. The first report of obesity due to a virus was published in 1982 by Lyon et al and 4 other animal viruses have been reported since. Of the 51 different human adenoviruses, to date, 3 have been shown to cause obesity in animal models, whereas 2 have not as reported by Dhurandhar's group. There are also experimental and clinical evidence linking activation of the innate inflammatory responses with diabetes. Our group has examined the presence of adenovirus 36 and found that its presence is independently associated with increased risk of obesity. The implication of this finding is that future policies on prevention of metabolic syndrome should also take infection control as a possible measure and that further studies on risk of metabolic diseases such as obesity, diabetes and heart diseases should also consider adenovirus infection as one of the relevant risk factors.

Ref. No. RFCID: 08070082

Ab34
Prevalence of non-alcoholic fatty liver disease and advanced liver fibrosis in Hong Kong: a cross-sectional population study using magnetic resonance spectroscopy and transient elastography

VWS Wong, GLH Wong, MKP Li, WCW Chu, D Yeung, HLY Chan
Department of Medicine and Therapeutics, CUHK

Background: Non-alcoholic fatty liver disease (NAFLD) is one of the most common chronic liver diseases worldwide. It may progress to cirrhosis and liver cancer.

Aims: We aim to study the prevalence of NAFLD and advanced liver fibrosis, and factors associated with NAFLD in the local Hong Kong population.

Methods: Potential study subjects were randomly selected from the census database. Liver fat was measured by proton-magnetic resonance spectroscopy. Liver fibrosis was measured using transient elastography (Fibroscan).

Results: As of June 2010, 490 subjects (47% males, age 48±11 years) have completed assessment. NAFLD was diagnosed in 146 (30%) subjects. The age- and gender-adjusted prevalence of NAFLD was 24%. The prevalence of NAFLD peaked in the 40-50 years age group in men. In comparison, the prevalence of NAFLD increased progressively from the <40 to >60 age groups in women. By multivariate analysis, central obesity, dyslipidaemia, hypertension, hyperglycaemia and male gender were independent factors associated with NAFLD. Mean liver stiffness measurement by transient elastography was 5.2±3.5 kiloPascal (kPa). Twenty-one (4%) patients had probable advanced

liver fibrosis based on a histologically validated cutoff value of 9.6 kPa. Probable advanced liver fibrosis was found in 11 of 144 (8%) patients with NAFLD and 10 of 338 (3%) patients without NAFLD (P=0.021).

Conclusions: NAFLD is highly prevalent in the general Hong Kong adult population and is strongly associated with the metabolic syndrome. Advanced liver fibrosis is common among NAFLD subjects.

Ref. No. HHSRF: 07080081

Ab178
Incidence and predictors of obesity: a 3-year follow-up study of the Hong Kong Population Health Survey

LM Ho[1], TH Lam[1], SY Ho[1], GN Thomas[2], BJ Cowling[1], SC Ho[3], TH Leung[4]
[1]School of Public Health, HKU
[2]Department of Public Health and Epidemiology, University of Birmingham, UK
[3]School of Public Health and Primary Care, CUHK
[4]DH

Background: Although obesity is clearly known to be largely a result of over-nutrition and under-activity, there is little evidence-based guidance on successful, viable long-term strategies to prevent or treat obesity. Research on psychosocial and behavioural factors related to overweight and obesity is also scarce. In Hong Kong, it is a common belief that overweight and obesity is increasing rapidly, but there are no incidence data on overweight and obesity.

Aims: To estimate the 3-year cumulative incidence of overweight and obesity, and to identify baseline predictors of overweight and obesity among those subjects who had normal weight initially.

Methods: Participants of the Population Health Survey during September 2003 to May 2004 were followed up using the same data collection protocols. Abdominal obesity was classified by Asian standards. Of the 3425 subjects with normal BMI status (i.e., BMI of 18.5 to 22.9) at baseline, 1405 were successfully followed up, representing a response rate of 41%. The differences in anthropometric measurements betweeen responders and non-responders were small.

Results: The 3-year cumulative incidence of being overweight (i.e., BMI of 23.0 to 24.9) or obese (i.e., BMI of 25.0 or above) was 16.2% (95% CI: 14.2%-18.2%), and 8.4% (95% CI: 7.0%-10.0%), respectively, among those who had normal initial BMI status. Multinomial logistic regression was used to study the relationship between BMI status at follow-up and baseline predictors, with the adjustment for demographic variables. In subjects with normal initial BMI status, higher BMI value (OR = 1.38 per kg/m^2, 95% CI: 1.20-1.59), lack of social support (OR = 1.58, 95% CI: 1.04-2.39), lower fruit intake (OR = 1.49, 95% CI = 1.06-2.08), and higher meat intake (OR = 1.58, 95% CI = 1.12-2.22) at baseline were associated with a higher risk of being overweight at follow-up. Subjects with a higher BMI value (OR = 1.28 per kg/m^2, 95% CI =1.07-1.54) and depressed mood at baseline (OR = 2.07, 95% CI = 1.10-3.89) were more likely to be obese at follow-up.

Conclusions: Our findings show that dietary factors (i.e., higher consumption of meat and lower consumption of fruits) and psychosocial measures (i.e., lack of social support and depression) were important predictors for overweight and obesity. More effective health education should not only emphasise what to eat and what to exercise, but also tackle psychosocial health.

Ref. No. HHSRF: 04060571

Ab217

Other ocular diseases detected in diabetic patients in a diabetic retinopathy screening programme

CKW Chan, D Wong, MKH Yap, CLK Lam, AJ Hedley, WW Lai, D Chiu, CH Lee, SM McGhee
School of Public Health, HKU

Background: Diabetic retinopathy (DR) is one of the major causes of blindness in developed countries and DR screening programmes are known to be an effective approach to reduce blindness. In the process of screening for DR, other co-existing eye disorders are often encountered. Some of these incidental findings are sight-threatening and consequently, the screening programme does more than alert the existence of DR.

Aims: To study the prevalence of other ocular conditions commonly found in the diabetic patients through a diabetic retinopathy screening in one of a primary care clinic in Hong Kong.

Methods: Our DR screening programme was delivered at the Aberdeen Clinic located in the west of Hong Kong Island. The patients were recruited from two general out-patient clinics (GOPC), Aberdeen and Ap Lei Chau Clinics. All diabetic patients who had attended any of the two clinics during the study period would be included in our sample size. The screening procedure included visual acuity measurement, anterior chambers examination with a slitlamp biomicroscope, and digital imaging of the fundus through dilated pupils. Two fundus photographs were taken from each eye (macula and the optic disc).

Results: Between March 2009 and August 2009, 2218 diabetic patients showed up for DR screening. The prevalence of DR based on the photographs was 21.82%, of which 17.09% were graded as R1 (mild retinopathy) and 1.17% were graded as R2 (moderate retinopathy). Photographs that were graded as R3 (severe retinopathy) or above (including maculopathy and photocoagulation) were present in just 3.56% and these were considered as sight-threatening retinopathy. Photographs that were considered as U (ungradable) was 11.27% and these might be due to other co-existing eye disorders causing the difficulties of capturing clear images. The prevalence of other ocular diseases were significant cataract (1.44%), pterygium (0.59%), age-related macular degeneration (0.95%), increased cup-to-disc ratio (2.80%), epiretinal membrane (3.16%), macular hole (0.05%), branch retinal vein occlusion (0.23%), myopic maculopathy (0.86%), retinal detachment (0.09%), naevus (0.05%), optic neuropathy (0.05%), retinal pigment epithelium (0.05%), intra-retinal microvascular anormalies (0.09%) and haemangioma bergmeister papillae/ racemose haemanginoma (0.09%).

Conclusions: The incidental findings found in our DR screening programme suggests that other ocular diseases are often present in patients attending for DR screening. Some of these diseases are sight-threatening and it is important to be detected and treated as early as possible. As a result, it is essential for all the diabetic patients to have their eyes screened every year.

Ab218

The economic burden of diabetes related to excess body weight in Hong Kong present and future

CH Lee, GN Thomas, CM Schooling, LC Wong, WL Cheung, SM McGhee
School of Public Health, HKU

Background: This study is to estimate the current and future cost of diabetes associated with excess body weight in Hong Kong.

Methods: Local information from routine and survey sources were used to estimate the prevalence of different levels of body weight by age group, the risk of developing diabetes by body weight and costs for health care use due to diabetes and its major complications. Overseas estimates were used for the risk of developing complications after diabetes has developed and the lifetime risk of diabetes by body weight (WHO Asian cut-off weight levels for overweight and obesity). The current annual health care costs of diabetes and the fraction attributable to excess body weight were calculated using the population attributable risk (PAR) approach. The average cost per case of diabetes was used in a Markov model which represented the local population to predict the future medical costs of diabetes due to excess body weight if prevalence of obesity was to increase in the future. All costs and utilisation data were based on the year 2006 and both public and private sector costs were included.

Results: The annual attributable health care costs of diabetes were more than HK$2.2 billion in 2006. The cost attributable to excess body weight was estimated to be around $1.1 billion per year of which almost $1 billion for inpatient care and $0.1 billion for doctor consultations. Around $0.9 billion of the health care costs were in public clinics or hospitals. The Markov model predicted that, of the 2006 population of 5,653,000 people aged over 18 years, there would be around 1.6 million cases of diabetes during the cohort's lifetime. Of these cases, 20% would be among those overweight and 42% among obese people. Those with excess body weight would have diabetes at a younger age than those of normal weight. There would be 127,690 people who would die before the age of 65 years and about half of these would be from the obese group. Of the $396 billion diabetes-attributable health care costs over the lifetime of this cohort, $81 billion (20%) would be spent on those who were overweight and $177 billion (45%) on obese people. On average, 13 out of 78 years of life expectancy for men and 16 years out of 84 years for women would be spent with diabetes. For those with diabetes who were overweight the duration of diabetes was 23 years (men) and 26 years (women) and for those who were obese 25 years (men) and 30 years (women). Assuming that, as a result of obesity levels in primary schools, future adult obesity levels rise by about 20%, there would be a 7% increase in the number of cases of diabetes, a 10% increase in the number of deaths under 65 years and an 8% increase in the health care costs.

Conclusions: Diabetes is a chronic disease which results in around 1,500 deaths and a health care cost of about $2 billion per year. If we estimate a future rise of about 20% in adult obesity, we would expect a rise of about 8% in health care costs and 10% in deaths in those below 65 years. The model developed in this project can be used to determine the impact on deaths under 65, life expectancy, years spent with diabetes and health care costs with changes in levels of overweight or the impact of interventions to stem such an increase.

Ab30
Identification of cellular enhancing and restricting factors of dengue virus egress

PG Wang, M Kudelko, K Kwok, R Bruzzone, B Nal-Rogier
HKU-Pasteur Research Centre Limited, HKU

Dengue has emerged as the most important life-threatening illness in the world, especially in Asian countries around Hong Kong, where the incidence of dengue haemorrhagic fever (DHF) is much greater than other continents. However, little is known about molecular and cellular processes sustaining egress of dengue virus in the host cell.

To better understand the viral and cellular determinants of dengue virus egress, we have established a dengue VLP producing stable cell line (HeLa-prME) and demonstrated that dengue VLP was able to mimic the budding and egress process of dengue viruses so that it constitutes a safe and convenient tool for the study of egress of dengue virus. Under the support of RFCID grant, HeLa-prME cells were used to screen a siRNA library that included 122 cellular membrane trafficking genes.

Our screen results revealed that knockdown of ADP-ribosylation factor (ARF) 1 and ARF6 had significant effects on VLP production by HeLa-prME cell. Experiments with other ARF proteins, which were not included in the siRNA library, showed that the ARF4/ARF5 double knockdown could inhibit VLP production but had no effect on secretion of other proteins such as soluble dengue E protein, suggesting the specificity of their involvement in VLP production. Further experiments using real virus showed that the depletion of ARF4/5 by siRNA could significantly reduced the replication of dengue 1 virus, dengue 4 virus and yellow fever virus, confirming the important role of ARF4 and ARF5 for not only dengue viruses but also other flavivirus.

Our study uncovered the importance of class II ARFs in the egress of dengue virus. Results from this project provided information on mechanism of dengue virus assembly and its dependence on cellular machineries.

Ref. No. RFCID: 08070952

Ab84
Characterisation of methicillin-resistant Staphylococcus aureus from pig carcasses in Hong Kong

M Boost[1], M O'Donoghue[2], J Ho[2], A Moodley[3], L Guardabassi[3]
[1]Department of Health Technology & Informatics, PolyU
[2]School of Nursing, PolyU
[3]Veterinary Disease Biology, Faculty of Life Sciences, Copenhagen University, Denmark

Background: MRSA ST398 has been isolated from pigs in Europe and Canada. In a preliminary study of pig carcasses in Hong Kong, we reported MRSA which belonged to a different lineage (ST9), with spa type t899. Subsequently a larger study determined the prevalence of porcine MRSA nasal colonisation and characterised antibiotic resistance mechanisms of isolates.

Methods: The anterior nares of 400 pigs were sampled after slaughtering and distribution to wet markets in Hong Kong. Swabs were cultured on MRSA Select and enriched in brain-heart infusion broth supplemented with 5% additional salt. Susceptibility testing was performed for a total of 15 antibiotics. Presence of the mec A gene was confirmed in isolates exhibiting resistance to oxacillin or cefoxitin, and SCCmec type was determined. Genes for resistance to tetracycline, erythromycin and chloramphenicol were identified by PCR. The presence of the gene encoding Panton–Valentine leucocidin (PVL) and genes for staphylococcal enterotoxins SEA, SEB, and SEC were determined by PCR amplification. Susceptibility to zinc chloride was determined by agar dilution. The X region of the protein A gene (spa type) was amplified and sequenced. The sequence was typed using RIDOM software.

Results: Thirty-nine percent of pig snouts (157/400) were MRSA colonised and overall 170 MRSA strains isolated. All isolates harboured mecA, were SCCmec Type IV (92%) or V (8%) and belonged to spa type t899 or closely related variants. Strains were multi-drug resistant,

with high levels of resistance to clindamycin (99%), tetracycline (98%), erythromycin (89%), ciprofloxacin (78%), chloramphenicol (67%), cotrimoxazole (34%), and quinopristin/dalfopristin (42%). Resistance to fusidic acid, and rifampicin was present in 3%, and 2% of isolates, respectively. All isolates were susceptible to vancomycin and tigecycline. Erythromycin resistance was all attributable to erm (C), and chloramphenicol to fex (A). The cfr gene was not found in any of the chloramphenicol resistant isolates. All tetracycline resistant strains carried tet (K), but 3% additionally carried tet (M). There was no reduced susceptibility to zinc chloride. All strains were negative for PVL. SEA and SEB co-existed in 95% of the isolates.

Conclusions: MRSA colonisation levels were high and strains resistant to a broader range of antibiotics than described for MRSA ST398. Based on spa typing and previous MLST typing, all isolates were presumed to be ST9, which recent reports suggest is the dominant porcine-colonising strain in Asia. The clinical significance of the presence of ST9 remains unclear at present but the extensive antibiotic resistance of concern. There was a high prevalence of enterotoxin producing strains which is in contrast to porcine ST398 which is negative for enterotoxins. The presence of enterotoxins suggests a risk to humans through contact or ingestion of pork meat or its products. Further monitoring is required to determine the risk to food safety and public health.

Ref. No. RFCID: 08070912

Ab85
Colonisation of butchers with MRSA of porcine origin in Hong Kong

M O'Donoghue[1], M Chan[2], J Ho[1], M Boost[2]
[1]School of Nursing, PolyU
[2]Department of Health Technology & Informatics, PolyU

Background: Numerous reports from Europe and North America have documented MRSA colonisation of swine and contamination of pig farmers, veterinarians and abattoir workers with strains of porcine origin, mainly ST398. ST9 has been reported from pigs and carcasses in Asia. Contamination levels of 10% of retail pork have been reported from the Netherlands and Canada. We investigated rates of MRSA contamination of local butchers working in wet markets, where recently slaughtered pigs are cut up.

Methods: Swabs collected from 300 pork butchers throughout Hong Kong were cultured on MRSA Select (BioRad) and enriched in brain-heart infusion broth before subculture on a further selective plate. Isolates were confirmed as *Staphylococcus aureus* and susceptibility testing performed. The presence of mecA was confirmed and SCCmec and spa types determined. Subjects completed a questionnaire on risk factors for MRSA carriage.

Results: Seventeen samples (5.6%) yielded MRSA, of which 15 harboured SCCmec type IV. Ten strains were t899 (ST9), previously reported from local pig carcasses. Five isolates were healthcare-associated: SCCmec type II, t701 (ST6), which was colonising two subjects at the same establishment, and single isolates of t008 (ST8), t002 (ST5) and t123 (ST45). The remaining isolates were t359 (ST747), previously reported from buffalo, and t375, reported from nasal colonisation. Antibiotic resistance was much higher in the t899 strains than other isolates. None of these butchers reported recent hospitalisation or a healthcare worker in the family. Two had recently received antibiotics, one for a skin infection. Four reported wound infections within the last year. All were exposed to meat for >9h per day.

Conclusions: Carriage of MRSA was higher in butchers than in the general community and similar to rates reported elsewhere for vets (6.5%) suggesting an occupational risk of colonisation and infection for butchers. In Hong Kong MRSA carriage rates in the community are approximately 1%. Although five strains were probably of health care origin, the high incidence of t899 (ST9) suggests cross-contamination from pork occurs frequently. Antibiotic resistance in MRSA of porcine

origin is much greater than in circulating health care associated strains. Butchers are at increased risk of wounds due to work related injury and may have increased risk of MRSA infection. None of the butchers routinely wore gloves. Colonised butchers may transfer MRSA to family members. Good hygiene practices and washing of hands after touching raw pork is advised.

Ref. No. RFCID: 08070912

Ab86
Colonisation of pigs in southern China with MRSA

M O'Donoghue[1], J Ho[1], M Boost[2]
[1]School of Nursing, PolyU
[2]Department of Health Technology & Informatics, PolyU

Background: Porcine methicillin resistant *Staphylococcus aureus* (MRSA) has been documented in Europe and North America. An increased risk of colonisation and infection of pig farmers and their contacts has been recognised. In Europe the majority of isolates belonged to ST398. We recently isolated MRSA from pig carcasses slaughtered in Hong Kong and found these to be ST9, which was confirmed by other studies to be the predominant strain in Asia. This study investigated MRSA colonisation of pigs at a large scale pig breeding facility in southern China.

Methods: Nasal swabs were collected from 38 sows, 34 weaners and 33 growing-finishing pigs and cultured on MRSA Select. The swabs were enriched in 5% salt brain-heart infusion broth and sub-cultured after 48h to a further MRSA Select. Susceptibility testing was performed. MRSA were confirmed by resistance to cefoxitin and oxacillin and presence of mecA. Strains were typed for SCCmec and spa.

Results: MRSA was isolated from 25/34 (73.5%) weaners and 25/33 (75.8%) finishers, but none from sows. All strains were resistant to clindamycin and most to erythromycin (98.2%), tetracycline (96.5%), quinupristin-dalfopristin (91.2%), and ciprofloxacin (84.2%). Resistance was also found to gentamicin (49.1%), chloramphenicol (43.8%), fusidic acid (7%) and cotrimoxazole (3.5%). All strains belonged to SCCmec type IVb and spa type t899 which was shown to be ST9.

Conclusions: High levels of MRSA colonisation exist in young pigs which may be associated with prophylactic antibiotic use during growth. The absence of colonisation in sows suggests this is not vertical transmission of the organism, but transfer between young pigs. The isolates appear to share characteristics with carcass isolates from Hong Kong, belonging to ST9 rather than ST398 found elsewhere. This clone appears to be widespread in China and is the dominant MRSA type isolated so far from pigs in this region. The isolates varied in antibiotic resistance with high rates of resistance to seven agents. The facility maintained a high standard of hygiene which would be expected to reduce cross-infection between buildings. The occupational risk for colonisation and subsequent with livestock associated MRSA has been well documented elsewhere. Reduction in the use of antimicrobials in pig husbandry may be necessary for control of the spread of porcine-associated MRSA.

Ref, No. RFCID: 08070912

Ab89
Detection and characterisation of extended-spectrum beta-lactamases among blood stream isolates of Enterobacter spp. in Hong Kong

PL Ho[1], RHL Shek[1], WC Yam[1], WM Lai[2]
[1]Department of Microbiology and Carol Yu Centre for Infection, HKU
[2]Department of Clinical Pathology, UCH

Background: Among Enterobacteriaceae, production of extended-spectrum ß-lactamases (ESBLs) is increasingly recognised as a cause of resistance to expanded spectrum cephalosporins. In large hospitals, this resistance mechanism is found in 10%–40% of *Klebsiella spp.* and *Escherichia coli.*

Aims: To detect and characterise ESBLs among blood stream isolates of *Enterobacter spp.* in Hong Kong.

Methods: A total of 139 consecutive and non-duplicate bloodstream isolates of *Enterobacter spp.* collected from inpatients in Hong Kong during 2000-2002 were studied for production of extended-spectrum beta-lactamases (ESBLs). All isolates were evaluated by the modified double-disc synergy test (m-DDST), the combined disc method (CDM) and the three-dimensional (3D) test. The m-DDST and CDM were modified by the use of cefepime discs. Beta-lactamases were characterised by isoelectric focusing and PCR sequencing using specific primers.

Results: ESBLs were identified in nine isolates (overall 6.5%), including seven of 39 (17.9%) *Enterobacter hormaechei*, one of 27 (3.7%) *Enterobacter aerogenes* and the only *Enterobacter intermedius* strain. The *E. intermedius* strain was positive only in the 3D test but not in the other two tests. The other eight strains were positive in all three tests. No ESBL was detected in the other species, including non-hormaechei members of the *Enterobacter cloacae* complex (n=61), *Enterobacter agglomerans* (n=7), Enterobacter gergoviae (n=4) and *Enterobacter sakazakii* (n=1). The ESBL content included five different CTX-M enzymes (CTX-M-9, CTX-M-13, CTX-M-14, CTX-M-24 and a novel CTX-M-2-like beta-lactamase), SHV-12 (n=2) and unidentifiable ESBLs with a pI of 7.7 or 7.9 in two strains. The seven ESBL-producing E. hormaechei were genotyped by pulsed-field gel electrophoresis and were found to be unrelated to each other. In three of the CTX-M-producing strains, ISEcp1-like elements, including promoters for the beta-lactamase gene, were found.

Conclusions: This study showed that the incidence of ESBL among certain bacteraemic Enterobacter isolates in Hong Kong is high. The relevance of careful speciation is highlighted by the finding that ESBL carriage was higher in E. hormaechei than among other species. The present study found that the simple application of NCCLS criteria designed for ESBL detection in *E. coli* and *Klebsiella spp.* would lead to many false-positive results in *Enterobacter spp.*, in contrast to specificities of 97%–99% reported for screening of *E. coli* and *Klebsiella spp.*. In our collection of *Enterobacter spp.*, our findings demonstrated that it may be possible to increase the test specificity by including cefepime in initial screening.

Ref. No. RFCID: HKU-B4-001

Ab90
Detection and characterisation of extended-spectrum beta-lactamases among blood stream isolates of Proteus mirabilis in Hong Kong

PL Ho, ATM Ho, KH Chow, KY Yuen
Department of Microbiology, HKU

Background: The emergence of extended-spectrum ß-lactamases (ESBLs) in Gram-negative bacteria has become a major public health concern. It is clinically important to detect and specifically target ESBL because ESBL-producers may be clinically resistant to many ß-lactams. Among *Proteus mirabilis*, strains harbouring CTX-M enzymes were previously observed in Italy (CTX-M-1), France (CTX-M-1 and -20), Brazil (CTX-M-8) and Argentina (CTX-M-2). Information on the prevalence of ESBL as well as the occurrence of CTX-M enzymes among *P. mirabilis* in Asian countries is lacking.

Aims: This study was conducted to evaluate the occurrence and characterisation of ESBLs in blood isolates of *P. mirabilis* collected over a 4 year period in Hong Kong.

Methods: The double-disc synergy test identified 13 (13.1%) isolates as ESBL-producers and 86 (86.9%) isolates as ESBL-non-producers. In terms of year of isolation, the ESBL rates were: 0% (0/26) in 1999, 0% (0/15) in 2000, 18.5% (5/27) in 2001 and 25.8% (8/31) in 2002. The ß-lactamase-specific PCR and sequencing revealed the following ESBL enzymes (Table): CTX-M-13 (n=8), CTX-M-14 (n=3), SHV-5 (n=2), and TEM-11 (n=1). In addition, TEM-2 was found in nine isolates and TEM-1b in one isolate. The 13 ESBL-producing isolates fell into five Dienes types: nine isolates for Dienes type A and one each for Dienes type B to E. Further analysis of the 13 isolates producing ESBL using PFGE identified five distinct pulsotypes and the results were concordant with that obtained by the Dienes test. Attempts to transfer ESBL phenotype from *P. mirabilis* to E. coli recipients were unsuccessful despite repeated testing. The ESBL-producing strains had one to four plasmids with size ranging from 1.5 to 300 kb. A common 45 kb plasmid was found in all the CTX-M-13-producing strains. The three CTX-M-14-producing strains had plasmids of different sizes.

Misc. ID

Conclusions: Our data revealed a high prevalence of ESBL among *P. mirabilis* that caused invasive infection in Hong Kong. Since ESBL screening of *P. mirabilis* was not routinely performed in the clinical laboratories, the ESBL status for 12 of the 13 ESBL-producing isolates was not reported at the time they were isolated. Despite a dramatic increase in the ESBL rate from 0% in 1999 to 25.8% in 2002, the change over time within this species and the clonal spread of Dienes-pulsotype A have gone completely unnoticed. As a result of this work, microbiology laboratories in the public sector now routinely perform ESBL test on *P. mirabilis*.

Ref. No. RFCID: HKU-B4-002

Ab91
Molecular epidemiology of community-associated methicillin-resistant Staphylococcus aureus

PL Ho, KY Yuen, WS Tse, TK Ng, TL Que, E Lai, R Yung
Department of Microbiology and Carol Yu Centre for Infection, HKU

Background: *Staphylococcus aureus* is a common cause of community- and healthcare-associated (HA) infections, such as skin and soft tissue infections (SSTIs), pneumonia, and bacteraemia. Traditionally, methicillin-resistant *S. aureus* (MRSA) infections are confined to individuals with established risk factors, for examples, nursing home residents, hospitalised individuals, patients submitted to operations, and using indwelling medical devices. Since the 1990s, there were increasing reports of MRSA infections in healthy individuals from the community without established risk factors. These infections occurred in the community and have been called community-associated MRSA (CA-MRSA)

Aims: To evaluate the clinical and epidemiologic features of individuals with community-associated methicillin-resistant *Staphylococcus aureus* (CA-MRSA) in Hong Kong from January 2004 to December 2005.

Methods and results: Twenty-four episodes of skin and soft tissue infections and 1 episode of meningitis due to CA-MRSA were identified. CA-MRSA infections or carriage was found in 6 (13%) of 46 household contacts. A total of 29 isolates were analysed by the Staphylococcus cassette chromosome mec (SCCmec) typing, pulsed-field gel electrophoresis (PFGE), and multilocus sequence typing. In addition, polymerase chain reaction detection of the genes encoding Panton-Valentine leukocidin was also carried out. It was observed that 24 had SCCmec IV/IVA and 5 had SCCmec V, and 23 were pvl positive. PFGE analysis clustered all except 1 isolate into 3 pulsed-field types (PFTs), HKU100 through HKU300. The HKU100 isolates had genotype ST30-IV identical to the Southwest Pacific clone. The HKU200 isolates belonged to ST59-V and were multi-resistant, including an ermB-mediated macrolide resistance trait, which is characteristic of the predominant CA-MRSA clone in Taiwan. The HKU300 isolates had unique features (ST8, Panton-Valentine leukocidin negative, and SCCmec IVA) typical of CA-MRSA in Japan.

Conclusions: There is concern that multiple lineages of CA-MRSA, including the widespread ST30-IV Southwest Pacific clone, are spreading in the Hong Kong community. Intrafamilial transmission of CA-MRSA occurs and could be easily under-recognised unless household screening is conducted. Our work has informed public health policy to make CA-MRSA a notifiable disease in Hong Kong in January 2007. Household screening would be conducted for all notified CA-MRSA and a course of decolonisation treatment. With this approach, CA-MRSA infection only recurred in 2.4% of the patients notified in 2007-2009 (data from Dr. Thomas Tsang, controller, CHP); comparing with 30 to 50% reported in the absence of such treatment reported by overseas investigators.

Ref. No. RFCID: HKU-B4-003

Ab92
Community-associated methicillin-resistant *Staphylococcus aureus* skin and soft tissue infections in Hong Kong

PL Ho[1], SK Chuang[2], YF Choi[3], RA Lee[4], ACH Lit[5], TK Ng[6], TL Que[7], KC Shek[8], HK Tong[9], CWS Tse[10], WK Tung[11], RWH Yung[2] on behalf of the Hong Kong CA-MRSA surveillance network

[1]Department of Microbiology and Carol YU Centre for Infection, HKU
[2]Centre for Health Protection, DH
[3]Department of Accident and Emergency, PYNEH
[4]Clinical Pathology, PYNEH
[5]Department of Accident and Emergency, PMH and YCH
[6]Clinical Pathology, PMH and YCH, [7]Clinical Pathology, TMH
[8]Department of Accident and Emergency, TMH
[9]Department of Accident and Emergency, QMH
[10]Clinical Pathology, KWH
[11]Department of Accident and Emergency, KWH

Background: The development of methicillin resistance in community strains of *Staphylococcus aureus* is a critical step in the evolution of this pathogen. Community-associated methicillin-resistant *S. aureus* (CA-MRSA) has the ability to cause serious and fatal infections in healthy individuals, such as necrotising pneumonia, meningitis, pyomyositis, and severe sepsis in addition to the more common skin and soft tissue infections (SSTI).

Aims: This prospective study assessed the epidemiology of community-associated methicillin-resistant *Staphylococcus aureus* (CA-MRSA) among patients with purulent skin and soft tissue infections (SSTIs) in Hong Kong.

Results: Among 298 patients with SSTIs, 10.4% (13/125) of all S. aureus isolates and 5% (12/241) of all abscesses were attributed to pvl-positive CA-MRSA. Overall, 77% and 69.9% of CA-MRSA and methicillin-sensitive *S. aureus* (MSSA) were susceptible to erythromycin, 77% and 74.8% to clindamycin, 100% and 97.1% to minocycline, and 100% and 98.1% to rifampin, respectively. Filipino ethnicity was the only clinical and epidemiologic factor significantly associated with CA-MRSA infection (odds ratio, 14.8; 95% confidence interval, 3.3-70.0; $P < 0.001$). Pulsed-field gel electrophoresis analysis showed that 6 CA-MRSA isolates belonged to the ST30-HKU100 clone, 5 belonged to the ST59-HKU200 clone, and 1 was singleton. Features of HKU100 isolates include SCCmec type IV, agr3, spa t019, and pan-susceptibility to non-beta-lactam antibiotics. In contrast, HKU200 isolates are characterised by having SCCmec type IV or V, agr4, spa t437, and variable non-beta-lactam susceptibility profiles. The major CA-MRSA spa types were shared by a minority of the MSSA.

Conclusions: The findings from this study indicated that CA-MRSA is rapidly emerging in the Hong Kong community and its importance as a public health issue. The finding has contributed to improvement of the existing surveillance and formulation of treatment strategies.

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Ab93
Antimicrobial resistance among uropathogens causing well-defined episodes of uncomplicated cystitis among adult women in primary care settings

PL Ho[1], KY Yuen[1], JYC Lo[2]
[1]Department of Microbiology, HKU
[2]Public Health Laboratory Centre, DH

Background: A prospective multicentre study was conducted to assess the epidemiology of antimicrobial resistance among uropathogens causing uncomplicated cystitis.

Methods: Adult women with clinical diagnosis of uncomplicated cystitis were enrolled from 54 participating centres distributed all over Hong Kong during 2006 to 2008.

Results: A positive urine culture was found in 59.5% (352/592) patients. The patients had mean age of 44.9 years, and most (89.2%) were otherwise healthy. The most prevalent causative organism was *Escherichia coli* (77%), followed by other Enterobacteriaceae (14.2%), staphylococci (5.1%), and other Gram-positive bacteria (3.7%). The resistance rates of E. coli to ampicillin, co-trimoxazole and ciprofloxacin were 52.8%, 29.5% and 12.9%, respectively, and 14 isolates (5.2%) were confirmed as extended-spectrum ß-lactamase (ESBL) producers. Of the ESBL producers, molecular studies showed CTX-M-14, CTX-M-24, or CTX-M-9. Nitrofurantoin and fosfomycin were active against N90% of the isolates, regardless of resistance phenotypes for other drugs. Pulsed-field gel electrophoresis of representative isolates showed that the antibiotic-resistant strains were genetically diverse. Patients with history of recent antibiotic use were significantly more likely to have infection by E. coli with co-trimoxazole resistance (odds ratio [OR], 2.8; 95% confidence interval [CI], 1.4–5.7; P = 0.003) and ciprofloxacin resistance (OR, 2.5; 95% CI, 1.1–5.8; P = 0.03).

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Conclusions: Knowledge of the resistance data and risk factors could inform better use of antibiotics for empiric therapy for acute uncomplicated cystitis.

Implications: Ampicillin and cotrimoxazole should not be used as first-line agents for empirical treatment of acute uncomplicated cystitis. As fluoroquinolone resistance remains less than 10% among isolate obtained from young women, these agents continue to be useful for empirical treatment. Nonetheless, the high rates of fluoroquinolone resistance among older women and patients with recent antibiotic treatment indicate the need to consider alternative agents such as nitrofurantoin, fosfomycin and amoxicillin-clavulanate as initial therapies.

Ref. No. RFCID: 03040212

Ab95
Streptococcus pneumoniae carriage in young children shortly after the universal use of the 7-valent conjugate pneumocccal vaccine (PCV7) in Hong Kong

PL Ho[1], SS Chiu[2], YL Lau[2], KT To[1]
[1]Department of Microbiology, HKU
[2]Department of Paediatrics and Adolescent Medicine, HKU

Pneumococcus is a kind of ubiquitous bacteria. Many healthy children are colonised with this bacteria in the upper respiratory tract (such as the nasopharynx). Since carriage occurs as part of the bacterial flora on the respiratory tract surface, no specific treatment is necessary. From its natural habitat in the upper respiratory tract, pneumococcus may occasionally cause infections that involve the middle ear, the lung or blood. At present, about 90 different serotypes of pneumococci are recognised. Recently, the government announced the introduction of a new pneumococcal conjugate vaccine (PCV7) to the childhood immunisation programme by the end of 2009. The vaccine covers seven of the most common serotypes. Nasopharyngeal carriage of pneumococcus can serve as an indicator for assessing the distribution of serotypes and the prevalence of antibiotic resistance in the community. In 2001, we reported the result of a surveillance which looked at the serotypes and antibiotic resistance of pneumococci carried by about 2000 children in our community. Here, we propose to conduct a similar study to document the current colonisation of pneumococci among young children. The serotype distribution, antibiotic resistance of the isolates and potential risk factors for carriage will be studied. In addition, we will assess the effect, if any of colonisation by *Staphylococcus aureus* on the serotype distribution of pneumococci. We aimed to enroll about 2000 children from all over Hong Kong. The study was approved in April 2010. The preliminary data showed that pneumococcus is carried by 10% of the children and about 55% belonged to types included in PCV7.

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Ab98
Early life infections and pubertal onset: evidence from Hong Kong's "Children of 1997" birth cohort

MK Kwok, GM Leung, TH Lam, CM Schooling
Life Course and Lifestyle Epidemiology Group, School of Public Health, HKU

Aims: Early puberty is associated with cardiovascular disease risk factors. With economic development, puberty occurs at younger ages, and may contribute to the emerging epidemic of non-communicable chronic diseases. Factors determining pubertal timing are poorly understood. The growth axis active during puberty (gonadotropic axis) is also active in the first few months of life and interacts closely with the immune system. We examined whether serious infectious morbidity in early life was associated with pubertal timing.

Methods: We used multivariable interval-censored regression in a population-representative Chinese birth cohort, "Children of 1997", comprising 88% of births in Hong Kong in April and May 1997, to examine the adjusted associations of serious infectious morbidity, proxied by number of hospital admissions (0, 1, 2+) for infectious illnesses in the first 6 months of life, with age at clinically assessed pubertal onset (Tanner stage II). From this prospective analysis, we reported time ratios, i.e., ratios of age at pubertal onset between groups. We also assessed whether any associations were mediated by infant growth, using the criteria of Baron and Kenny.

Results: Of the original 8,327 cohort members, as of 30 June 2010, 7,933 were alive, had not withdrawn and were living in Hong Kong, and of these, 6,971 had information on age at pubertal onset and were included in the analysis. The estimated mean age at pubertal onset was 11.8 years in boys and 9.6 years in girls. Infants who were admitted for infections at least twice in the first 6 months of life had later age at pubertal onset, time ratio 1.04 (equivalent to pubertal onset ~5 months later), 95% confidence interval 1.01 to 1.07 compared with none, adjusted for sex, gestational age, birth weight and socio-economic position. There was little evidence that infant growth mediated the association. Hospitalisations for infections in later infancy or early childhood (i.e. 6 months-8 years), when the gonadotropic axis is quiescent, were not associated with the timing of pubertal onset.

Conclusions: Reduced exposure to infections in early life with economic development may be an additional factor contributing to earlier puberty.

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Ab107
Identification of novel porcine and bovine parvoviruses closely related to human parvovirus 4

SKP Lau[1,2,3], PCY Woo[1,2,3], H Tse[1,2,3], CTY Fu[3], HW Tsoi[3], JSY Chan[3], KSM Li[3], BJ Zheng[1,2,3], KH Chan[1,2,3], KY Yuen[1,2,3]
[1]State Key Laboratory of Emerging Infectious Diseases, HKU
[2]Research Centre of Infection and Immunology, HKU
[3]Department of Microbiology, HKU

Human parvovirus 4 (PARV4), a recently discovered parvovirus found exclusively in human plasma, was considered phylogenetically distinct from other parvoviruses. Here we report the discovery of two novel parvoviruses closely related to PARV4, porcine hokovirus (PHoV) and bovine hokovirus (BHoV), from porcine and bovine samples in Hong Kong. Their nearly full-length sequences were also analysed. PARV4-like viruses were detected by PCR among 44.4% (148/333) of porcine samples (including lymph nodes, liver, serum, nasopharyngeal and faecal samples), 13% (4/32) of bovine spleen samples and 2% (7/362) of human serum samples sent for HIV and HCV antibody tests. Three distinct parvoviruses were identified, including two novel parvoviruses, PHoV and BHoV, from porcine and bovine samples and PARV4 from humans respectively. Analysis of genome sequences form seven PHoV, three BHoV and one PARV4 strains showed that the two animal parvoviruses were most similar to PARV4 with 61.5-63% nucleotide identities and, together with PARV4, formed a distinct cluster within Parvoviridae. The three parvoviruses also differed from other parvoviruses by their relatively large predicted VP1 protein and the presence of a small unique conserved putative protein. Based on these results, we propose a separate genus, Hokovirus, to describe these three parvoviruses. The co-detection of porcine reproductive and respiratory syndrome virus, the agent associated with the recent "high fever" disease outbreaks in pigs in China, from our porcine samples warrants further investigations.

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Ab115
Modulatory effects of antimicrobials on the pathogenicity of community-acquired methicillin-resistant Staphylococcus aureus in Hong Kong

CKY Wong[1], ETY Leung[1], KF To[2], M Ip[1]
[1]Department of Microbiology, CUHK
[2]Department of Anatomical and Cellular Pathology, CUHK

Background: Community-acquired methicillin-resistant *Staphylococcus aureus* (CA-MRSA) infections have emerged as a major health concern worldwide. Besides Panton-Valentine-Leukocidin (PVL), a group of staphylococcal peptides, the phenol-soluble modulin (PSM) peptides, were identified as major virulence determinants in CA-MRSA. These toxins, together with many virulence determinants such as alpha-haemolysin (hla) are regulated by the accessory gene regulator (agr) system. Previous studies showed that agr system can be activated by cell-wall targeting antibiotics. We hypothesise that cell-wall targeting antibiotics alter expression of virulence determinants and affect the outcome of disease.

Objectives: To investigate (i) the *in vitro* effects of cell-wall-targeting antibiotics on the expression of virulence factors, on the CA-MRSA strain (ST30, the Southwest Pacific clone) prevalent in Hong Kong; (ii) the *in vivo* effects of cell-wall-targeting antibiotics on the treatment outcome of CA-MRSA infection using a mouse necrotising pneumonia model.

Material and Methods:

In vitro studies: 1) The effect of antibiotics on the induction of two regulators (agr, msrR) and six virulence genes (PSMs-alpha 1, 2, 3, 4, hla, PVL) will be measured by quantitative RT-PCR; and 2) Virulence is determined by human neutrophils lysis assay by using secretions of antibiotic-induced virulence proteins.

In vivo studies: To develop a mouse necrotising pneumonia model to study the severity of disease and outcome in relation to the antibiotics used on CA-MRSA infections. The intranasally infected lungs will be graded according to lung histology based on a severity scoring system.

Results: *In vivo* optimisation of bacterial load, length of infection period, antibiotic concentrations and histological severity grading scale has been completed. A mouse pneumonia model to study the antibiotic effects on CA-MRSA infection is established. The study is ongoing.

Implications: With CA-MRSA, drugs with virulence modulatory effects, or regimens that would reduce the toxin production and hence the severity of disease may be more preferable. This study is an invaluable approach to the understanding of the present management and future therapeutic targets of CA-MRSA infections.

Ab155
Methionine aminopeptidase as a novel target for development of antibiotic therapeutics against Staphylococcus aureus: a proteomic approach

RYT Kao[1], FM Siu[2], CM Che[2], KY Yuen[1]
[1]Department of Microbiology, HKU
[2]Department of Chemistry, HKU

Background: *Staphylococcus aureus (S. aureus)* causes pneumonia, surgical-site and catheter-related infections, and bloodstream infections. *S. aureus* is a common aetiologic agent of pneumonia in the hospital setting and is frequently as a consequence of influenza. *S. aureus* with high-level resistance to antibiotics are increasingly being found. Recently, the vitality of the methionine aminopeptidase (MetAP) gene in *S. aureus* has been experimentally illustrated in our laboratory. The availability of a MetAP knockout strain provides an excellent basis for proteomic research. Our preliminary investigation on the wild type and MetAP deficient mutant strains of *S. aureus* using a proteomic approach showed that more than 100 proteins were expressed differentially.

Methods: By using two-dimensional electrophoresis (2-DE) tandem mass spectrometric method (MS/MS) and database searching, we have compared protein expression profiles of wide-type and MetAP deficient mutant strains of *S. aureus*. We used quantitative RT-PCR to evaluate the associations between gene expression levels and protein expression levels in selected genes identified in the 2-DE.

Results: We identified 53 proteins that were differentially expressed in the wild type and the MetAP deficient mutant *S. aureus* and quantified their protein expression level using ImageScanner (GE Healthcare). Among those proteins that were differentially expressed in the wild type and the MetAP deficient mutant, we selected a cluster of genes involved in the purine synthetic pathways and other major biological processes for further validation of their gene expression profiles by quantitative RT-PCR. Most of the genes selected matched the protein expression profiles of the 2-DE results but the branch-chain amino acid aminotransferase (ilvE), one of the major enzymes involved in the conversion of ketomethiobutyrate (KMTB), was not regulated at the transcriptional level in response to MetAP deficient state in *S. aureus*.

Conclusions: Our study suggests that the impact of MetAP deficiency in *S. aureus*, and possibly in other organisms as well, is profound and multidimensional. A wide array of genes, spanning nucleotide biosynthesis, energy production, protein synthesis, glycolysis, electron transport, vitamins biosynthesis and metabolism, transcription regulation, amino acid production, fatty acid metabolism, are affected by the deficiency of MetAP. Our study has provided evidence the first time that MetAP may be linked to methionine recycling and purine biosynthesis pathways.

Implications: *S. aureus* as a common aetiologic agent of pneumonia and a consequence of influenza, these contribute to a high economic burden in the hospital system. Our study of *S. aureus* MetAP deficiency indicates that MetAP could be a useful therapeutics target for antibiotics development, which could be benefit to the health / health care of Hong Kong and worldwide.

Ab261
Identification of novel host-response biomarkers for diagnosis of late-onset septicaemia and necrotising enterocolitis in pre-term infants by proteomic approach

TCW Poon[1,2], IL Ang[1,2], RWK Chiu[1,4], K Li[1,3], HS Lam[3],
RPO Wong[3], KM Chui[3], HM Cheung[3], EWY Ng[1,2], TF Fok[3],
JJY Sung[1,2], DYM Lo[1,4], PC Ng[1,3]
[1]Li Ka Shing Institute of Health Sciences, CUHK
[2]Department of Medicine and Therapeutics, CUHK
[3]Department of Pediatrics, CUHK
[4]Department of Chemical Pathology, PWH, CUHK

Pre-term infants are highly susceptible to life-threatening infections that are clinically difficult to detect, such as late-onset septicaemia and necrotising enterocolitis (NEC). Both late-onset septicaemia and NEC are associated with an uncontrolled hyper-inflammatory host response. As mass spectrometry-based proteomic profiling is useful in identifying biomarkers reflecting host response, we applied this approach to identify host-response markers for diagnosis of these two devastating conditions. In a case-control study comprising 77 sepsis/NEC and 77 non-sepsis cases (10 in each group being monitored longitudinally), plasma samples collected at clinical presentation were assessed in the biomarker discovery and independent validation phases. The discovered biomarkers were further validated in a prospective cohort study with 104 consecutively suspected sepsis/NEC episodes.

Pro-apolipoprotein-CII (Pro-Apo-C2) and a des-arginine variant of serum amyloid A (SAA) were identified as the most promising biomarkers. The ApoSAA score computed from plasma Apo-C2 and SAA concentrations, which were measured by immunoassay, was effective in identifying sepsis/NEC cases, with areas under the receiver operating characteristics curves being 0.96 and 0.93 in the case-control and prospective cohort studies, respectively. Stratification of infants into different risk categories by the ApoSAA score enabled neonatologists to withhold treatment in 45% and early stoppage of antibiotics after 24 hours in 16% of non-sepsis infants. The negative predictive value of this novel antibiotic policy was 100%.

The ApoSAA score could potentially allow early and accurate diagnosis of sepsis/NEC. Upon confirmation by further multicentre trials, the score would facilitate rational prescription of antibiotics and target infants who require urgent treatment.

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Ab27
Neck pain in Hong Kong: a telephone survey of the consequences and health service utilisation

TW Chiu[1], SL Leung[1], KW Lam[2]
[1]Department of Rehabilitation Sciences, PolyU
[2]HA

Background: There has been a lack of reliable information on the health service utilisation pattern of neck pain subjects, the consequences and the patient perceived effectiveness of neck pain management in Hong Kong and Asian countries.

Aims: 1) To investigate the prevalence and consequence of neck pain in terms of disability and rate of absenteeism from work. 2) To describe the health service utilisation pattern of neck pain subjects and to analyse factors associated with neck pain and health services utilisation pattern of neck pain subjects.

Methods: A regionally representative telephone survey using a two-stage randomisation process. The inclusion criteria were being Hong Kong residents older than 15 years and Cantonese speaking.

Results: From 6,754 eligible telephone lines dialed, 4,640 subjects were selected and successfully interviewed. The response rate on all eligible line was therefore 68.7% (4,640 of 6,754). The mean time for interview of respondent who correspond to our definition of neck pain was 15.7 minutes (range, 7-39 minutes; SD, 3.4 minutes). The 12 month prevalence was 64.6% (95% CI 63.2%-66.0%). About 38.0% of these patients suffered from moderate to severe pain. Moreover, 17.7% of these subjects had to limit their social activities and 19% had to limit their work. 3.6% have to apply for sick leave due to neck pain during past 12 months; the mean of sick leave for 100 respondents is 19.4 days. About 25% of those subjects have consulted medical or health practitioners. Medical consultation is the majority and physiotherapy came second. Self-message was the most preferred (83.3%) mode of self-care. Physiotherapy was regarded as the most effective health service with 60% of the respondents' neck pain completely removed. Although most people chose self-massage to be the most effective self care treatment, about one-third (30.2%) of them had their neck pain improved by less than a half.

Conclusions: Neck pain is highly prevalent with increasing impact in Hong Kong. More than one third of neck pain patients suffered from moderate to severe pain and around 20% of them had to limit their work. Physiotherapy and private medical clinic were the two service providers with high percentage of perceived complete improvement. Although self-massage was regarded as the most preferred self care treatment to deal with neck pain, the effect was not satisfactory. There was a general trend that more neck pain patients used complementary therapies.

Implications: The implications for clinicians and policymakers is that increased funding for research aimed at improving the diagnosis and management of neck pain should be implemented without further delay. Educators for health and medical professionals should consider expanding course curricula to allow more time for this prevalent condition.

Ab46
Quality of life and symptom measurements in Chinese women with pelvic floor disorders: validation study of Pelvic Floor Distress Inventory and Pelvic Floor Impact Questionnaire

SSC Chan, RYK Cheung, AKW Yiu, BPY Lai, SMW Pang, RKW Choy
Department of Obstetrics and Gynaecology, CUHK

Background: Pelvic floor disorders (PFD) include pelvic organ prolapse, urinary incontinence, voiding dysfunction, faecal incontinence, and defecatory dysfunction, are common in women. Women suffering from PFD have significant symptom distress and impairment of their quality of life. Pelvic Floor Distress Inventory (PFDI) and Pelvic Floor Impact Questionnaire (PFIQ) are comprehensive instruments to assess PFD.

Aims: The aim of the study was to investigate the reliability and validity of PFDI and PFIQ in Chinese women suffering from PFD, which would provide a standardised, reproducible, and objective instrument in assessing PFD and different therapy.

Methods: Approval to use PFDI and PFIQ was obtained and standard translation process and back-translation was performed. Chinese women attending the Urogynaecology clinic of New Territories East Cluster (PWH, AHNH and NDH) with PFD were recruited and written consent was obtained. They filled in the Chinese version of PFDI and PFIQ and SF-36, followed by assessment by a blinded attending physician whom examined them and determined the severity of PFD. Both the subject and the attending physician graded their overall severity of PFD on a visual analogue scale (VAS). Subjects kept a 3-days urinary and faecal diary. Those with indication were followed by uroflowmetry and cystometry testing, anal manometry and anal ultrasound scanning. The reliability of the scales was estimated by the internal consistency (Cronbach's alpha) and test-retest reliability (Spearman-Brown coefficient). Reliability coefficients of .80 or above indicate that the test is reliable.

Results: Results of the first 200 subjects and only the internal consistency and test-retest reliability were reported here. The mean age was 55.8 (standard deviation 11.8) years. The chief complain was pelvic organ prolapse in 31.4% and urinary incontinence or other urinary symptoms in 68.6%. The internal consistency of different subscales of PFDI and PFIQ was .86 to .91 and 0.97, and the test-retest reliability of different subscales of PFDI and PFIQ was .77 to .79 (p <0.01) and .65 to .74 (p <0.01) respectively. (Table I-II)

Conclusions: There was high internal consistency and moderate to high test-retest reliability of the Chinese version of PFDI and PFIQ. Further evaluation on the validity of the questionnaires is pending. The preliminary result suggested that PFDI and PFIQ could be an optimal objective instrument for assessing women with PFD and studying their outcome after different therapy.

Ab180
Psychological needs of rheumatic patients in Hong Kong

PMC Young[1], PWH Lee[2]
[1]School of Nursing, PolyU
[2]Department of Psychiatry, HKU

Background: Rheumatic diseases are an autoimmune disorder that causes the immune system to attack joints, leading to a chronic systemic inflammatory disease. Health conditions of rheumatic patients run an erratic course with the possibility of disfiguration and alteration in body image. Patients generally face multiple difficulties in daily living, work activities, and social life. Problems of depression, low self-esteem and psychological maladjustment are prevalent.

Aims: The aim of this study is to identify the psychological needs of rheumatic patients and their perceptions towards their diseases.

Methods: Focus group interviews were employed to understand patients' feelings about the diseases and difficulties. All interviews were recorded and transcribed into Chinese word by word for theme identification. A self-administered questionnaire was designed based on focus group interviews and the Leventhal's self-regulation model. The questionnaire includes type of disease, illness perception and health status. Subjects were recruited from several rheumatic disease associations in Hong Kong. The questionnaires were distributed to the patients during mass gatherings, through social network, and by mailing.

Results: Five focus group sessions were conducted with a total of 31 patients. Some of the patients were worried about their family's financial problem for being unable to work. Some ended up in divorce as reportedly their spouses did not want to take care of them. Some had entertained the idea of suicide. All patients believed that information about the nature of the diseases is important to the public in order to increase understanding and support from the community. A total of 191 patients responded to the questionnaire survey, with a response rate of 70%. Assessed with SF-12, 32.5% and 12.6% of the

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patients had poor physical (i.e., physical component score of less than 35) and mental health (i.e., mental component score of less than 35) respectively, compared with only 7.3% and 7.0% of the Hong Kong population in 2006. Logistic regression analysis shows that their illness perception was a significant predictor for poor physical and mental health, after adjusted for demographics.

Conclusions: About half of the patients worried about their future and health condition, and felt hopeless. They generally had poor physical and mental health, particularly among those who had poor emotional representations or negative perception about their disease. The understanding of how patients perceive their disease can help develop interventions to promote positive adaptation in the face of their deteriorating health conditions. Promotion of public understanding and support is also important for them.

Ab202
Comparing the effectiveness of mindfulness based stress reduction and a multidisciplinary intervention program for chronic pain: a randomised comparative trial

SYS Wong[1], FWK Chan[1], RLP Wong[1], MC Chu[2], KYY Lam[3], SW Mercer[1], SWH Ma[4]
[1]School of Public Health & Primary Care, CUHK
[2]Department of Anaesthesia and Intensive Care, PWH
[3]Jockey Club Centre for Osteoporosis Care and Control, CUHK
[4]Private Clinical Psychologist and MBSR instructor

Aims: Research showed that an eight-week Mindfulness-Based Stress Reduction (MBSR) program may be effective in the treatment of various health problems including chronic pain. Our objective is to compare the clinical effectiveness of the MBSR programme with multidisciplinary pain intervention (MPI) programme on pain intensity, disturbance-by-pain, quality of life and mood in patients with chronic pain.

Methods: A randomised, comparative clinical trial including 6-month post-treatment follow-up was conducted. Subjects aged 24 to 64 years suffering from pain for a minimum of three months were recruited from community-based clinics, hospitals, and community service centres. Participants were randomly allocated to either the Mindfulness-Based Stress Reduction (MBSR) programme or a Multidisciplinary Pain Intervention (MPI) programme. Validated Chinese version of instruments measuring pain, mood symptoms and health related quality of life were used.

Results: 99 patients were included in the analysis, of whom 39 out of 51 (79%) completed the MBSR programme and 44 out of 48 (90%) completed the MPI programme. Patients in both groups did not differ with regards to demographical characteristics, pain intensity, mood symptoms and health related quality of life scores prior to intervention. Patients in both groups that completed the trial demonstrated statistically significant improvements in pain intensity, disturbance-by-pain, anxiety symptoms and health related quality of life. However, no statistically significant differences were observed between the MBSR and MPI groups.
Conclusions: This randomised clinical trial showed that both MBSR and MPI programme reduced pain intensity, pain disturbance and anxiety, and improved health related quality of life in patients with chronic pain.

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Ab220
Comparison of oral prednisolone and oral indomethacin in the treatment of acute gout-like arthritis: a multi-centre, double-blind, randomised trial

CH Cheng[1], CY Man[1], CA Graham[1], YF Choi[2], KH Lee[4], WH Yau[3], LS Tam[1], TH Rainer[1]
[1]PWH
[2]PYENH
[3]QEH
[4]UCH

Background: Acute gouty arthritis causes significant morbidity worldwide. In Hong Kong, gouty arthritis is common, accounting for about 2 attendances per day at Emergency Departments (ED), of which 50% will require admission to hospital or prolonged periods of observation because of immobility and pain.

Aims: The aim of this study is to compare the efficacy and safety of oral prednisolone and oral indomethacin therapy in the treatment of acute gout like arthritis. We hypothesise that oral prednisolone will be as effective as oral indomethacin therapy at resolving symptoms but will be associated with fewer side effects and shorter hospital length of stay.

Methods: A multi-centre, double-blind, randomised equivalence trial, comparing the analgesic efficacy and safety of oral prednisolone and oral indomethacin. All adult patients presenting to ED of the four designated centres with acute gout-like arthritis will be considered for entry into the trial. The two primary outcome measures are analgesic efficacy measured using the VAPS and the presence or absence of adverse effects.

Implications: This study will provide evidence on the analgesic efficacy, anti-inflammatory efficacy and safety of steroids in the management of gout. From a previous study, the odd ratio of adverse events in patients receiving NSAIDs was 74 with reference to the steroid arm. For every 100 patients with gout treated with steroids rather than NSAIDs, it may be possible to save seven patient admissions.

Ab237
Cost-effective osteoporosis intervention thresholds for Hong Kong Southern Chinese postmenopausal women

J Chau[1], SWY Tsang[2], SM McGhee[1], AWC Kung[2]
[1]School of Public Health, HKU
[2]Department of Medicine, HKU

Background: The importance of osteoporosis arises from its complication of fragility fractures which are associated with high morbidity and mortality. Osteoporosis affects mostly elderly persons, and therefore the disease has imposed high economic burdens on societies with an aging population such as Hong Kong. Intervention thresholds for osteoporosis should be based on absolute fracture risk. The World Health Organization fracture risk assessment algorithm (FRAX) incorporates information on a range of independent clinical risk factors of osteoporotic fracture (OF) together with bone mineral density (BMD) T-score values to determine the 10-year absolute fracture risk. However, there is a lack of local information to determine the absolute OF risk at which the intervention threshold becomes cost-effective in Hong Kong.

Aims: To define the intervention thresholds at which the absolute 10-year risk of OF become cost-effective in Hong Kong southern Chinese postmenopausal women, which incorporates Hong Kong estimates of fracture incidence, morbidity, mortality and cost data.

Methods: A Markov cohort state-transition model is being built to simulate osteoporosis treatment thresholds in a hypothetical population-based cohort of OF-free Hong Kong southern Chinese postmenopausal women. The yearly-transitions between the health states will be tracked until they are 100 years of age or dead, taking into account the local incidence of hip, vertebral and wrist fracture and mortality rates. Cost-effectiveness analysis will be conducted from a societal perspective. The lifetime costs and quality-adjusted life years (QALYs) will be estimated under two alternatives: (1) no treatment and (2) osteoporosis treatment for 5 year. Local costs will include intervention costs (BMD tests, assessment tests, drugs and monitoring) and direct and indirect fracture costs (hospitalisation, nursing home, out-patient visits, aids and home modifications and productivity loss). Utility values in estimating QALYs will be taken from overseas. Incremental cost-effectiveness ratio (ICER) between the treated and untreated cohorts will be calculated with the efficacy of treatment assumed as 35% based on clinical trial data. Future costs and health effects are to be discounted at 3% per year. The main assumptions and estimates will be tested in sensitivity analyses.

Results and conclusions: A Hong Kong-specific cost-effectiveness analysis is in progress to define the therapeutic threshold for OF which will lay the foundation for cost-effective treatment of osteoporosis. The findings of this study will assist clinicians in identifying high risk fracture patients for cost-effective osteoporosis treatment in Hong Kong.

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Ab67
Fruit and vegetable intakes of Hong Kong adolescents

WS Lo, SY Ho, KK Mak, TH Lam
School of Public Health, HKU

Aims: Insufficient fruit and vegetable intake may increase the risk of obesity and chronic diseases. The Population Health Survey 2003/04 showed that 16.3% of people aged 15 or over in Hong Kong had five or more servings of fruit and vegetable daily. Information about adolescents is lacking. Territory wide health education campaigns to promote healthy eating were conducted in Hong Kong in recent years. We compared fruit and vegetable consumption of Hong Kong adolescents in 2006 and 2009.

Methods: Form 1 to 7 students from the same 14 secondary schools reported fruit and vegetable intake using a questionnaire in 2006 (n=8156) and 2009 (n=10799). For fruit, we recorded the number of servings consumed each day, where one serving roughly equals a medium-sized apple or orange. For vegetable, we recorded the number of normal-sized bowls of cooked vegetable consumed each day, and one bowl equals two servings. Ten options from none to >4 servings of fruit or four bowls of vegetable were provided. The consumption of ≥5 servings of fruit and vegetable in total was considered sufficient.

Results: Fruit intake decreased significantly from 1.04 to 1.01 servings per day from 2006 to 2009 (p=0.02). Vegetable intake decreased from 2.22 to 2.19 servings per day over the same period (p=0.24). The proportion of students who had ≥2 servings of fruit and ≥3 servings of vegetable per day decreased from 17.9% to 16.8% (p=0.04) and 31.7% to 29.6% (p=0.002), respectively. The prevalence of sufficient fruit and vegetable intakes was similar in 2006 (20.0%) and 2009 (19.8%) (p=0.8).

Conclusions: Only around one-fifth of Hong Kong adolescents consumed sufficient fruit and vegetable per day. Moreover, there was a small decrease in fruit and vegetable intake from 2006 to 2009. More efforts are needed to promote fruit and vegetable consumption in Hong Kong adolescents.

Ab77
A structural equation model of the inter-relationships between physical activity, mental distress, and diabetes self-care among patients with Type 2 diabetes mellitus

LWH Mui, JTF Lau
School of Public Health and Primary Care, CUHK

Background: Prevalence of Type 2 diabetes mellitus is on the rise in Hong Kong. Proper self-care is paramount to control diabetes. The American Diabetes Association recommended at least 150 min/wk of moderate-intensity physical activity for patients with diabetes. Depression, along with anxiety and stress, has been shown to negatively affect physical activity in oversea studies.

Aims: To model the inter-relationships between time-spent on physical activity, exercise efficacy, attitudes towards exercise, subjective norm, instrumental social support, depression, anxiety, stress, diabetes self-care, and self-care self-efficacy. And to test whether participation in physical activity was correlated with better self-care in other aspects of self-care, and vice versa

Methods: 576 Type 2 diabetes patients were recruited from two diabetes clinics in this cross-sectional study and were interviewed through telephone. Structural equation modelling (SEM) was used to model the inter-relationships between the variables of interest.

Results: More than 40% of the patients did not meet the ADA physical activity recommendation. Our model showed that exercise efficacy (ß=0.478, p<0.001) and attitudes towards exercise (γ=0.231, p<0.001) were significant predictors of physical activity. Instrumental social support had an indirect effect on physical activity through affecting exercise efficacy (ß=0.194, p<0.001). Although instrumental social support also affected other variables such as self-care self-efficacy, depression, anxiety, stress, and subjective norm, those factors did not show any significant correlation with physical activity (p>0.05).

This model also showed that physical activity was correlated with other area of diabetes self-care (ß=0.140, p< 0.001). However, when we fitted a similar model that tested whether other area of diabetes self-care would affect physical activity that relationship was found to be non-significant (p>0.05).

Conclusions: Patients' physical activity was correlated with other area of diabetes self-care but not the other way round. Physical activity might be more difficult to perform for the patients than other self-care activities. Intervention programme that aims at improving patients' exercise efficacy, attitudes towards exercise, and instrumental social support should be implemented to improve patients' physical activity.

Implications: Incorporation of behavioral health components and the expertise of health psychologist and/or behavioral scientist into clinical care team should be considered.

Ab87
The effect of Taekwondo training on sensorimotor performance and balance in adolescents in Hong Kong

SSM Fong, GYF Ng
Department of Rehabilitation Sciences, PolyU

Background: Taekwondo (TKD) is a popular sport worldwide and there are more than 20,000 people practicing it in Hong Kong. Its training emphasis is on kicking and single-leg stance movements that require high level of postural control. Despite its popularity and high demand on balance, studies on the physical benefits of TKD are scarce and no study has investigated the effect of TKD training on balance performance in youngsters.

Aims: This study was, therefore, conducted with the aims to compare (1) the single leg standing balance performance, (2) knee joint proprioceptive sense, and (3) lower limb muscle strength of adolescent TKD practitioners with non-practitioners.

Methods: 21 adolescents (11-14 years old) who received regular training in TKD were recruited and divided into 2 groups: short-term training (1-4 years of TKD experience) and long-term training (5-9 years of TKD experience). 10 age and sex matched sedentary individuals were also recruited as control. Single leg standing balance was measured with the SMART EquiTest® computerised dynamic posturography machine. Knee joint proprioception was measured with the passive positioning-active repositioning test of the dominant leg. Concentric isokinetic knee extension strength of the dominant leg was also tested using the Cybex Norm dynamometer at an angular velocity of 180°/s. One-way ANOVA was used to compare the variables of interest among the 3 groups. Alpha was set at 0.05. Significant results were further analysed with post-hoc Bonferroni test.

Results: The results revealed a significant difference in centre of gravity sway with unilateral stance ($F_{2,28}=6.297$, p=0.006) and knee joint repositioning error ($F_{2,28}=8.333$, p=0.001) among the 3 groups. Post-hoc contrasts revealed that both short and long term TKD practitioners swayed significantly less than control subjects when standing on the non-dominant leg with eyes open (p=0.016 and 0.012, respectively). However, only long-term TKD practitioners showed significantly less knee joint repositioning error than control subjects (p=0.001). In addition, there was no significant difference in isokinetic knee extensors strength among the 3 groups.

Discussion: The present study demonstrated that TKD practitioners had better balance control in single leg standing. This could be explained by the fact that TKD training puts great emphasis on kicking techniques. Long-term training in TKD could also improve the knee joint position sense which plays an important role in postural control. However, the improvement in balance performance might not be associated with knee extensor muscle strength.

Conclusions: Regular TKD practice might benefit the adolescents in terms of balance but not leg muscle strength. One year of TKD training could improve single leg standing balance but longer term of training is needed so as to improve knee joint position sense. Clinicians might advocate TKD exercise as a therapeutic intervention for adolescents to improve balance.

Ab99
Does childhood diet or physical activity mediate the association of paternal smoking with child obesity?

MK Kwok, CM Schooling, TH Lam, GM Leung
Life Course and Lifestyle Epidemiology Group, School of Public Health, HKU

Aims: Paternal smoking is prospectively associated with higher child body mass index (BMI), with a similar magnitude of effect as maternal smoking during pregnancy. However, socio-economic position is associated with parental smoking, poorer diet, less physical activity and more television (TV) watching, so that the observed association of paternal smoking with childhood overweight may be due to other factors. We examined whether childhood diet or physical activity mediated the association between paternal smoking and child BMI.

Methods: We used multivariable linear regression to examine the adjusted associations of paternal smoking with child's dietary index, and logistic regression to examine the adjusted associations with physical activity and TV watching in a population-representative Chinese birth cohort, "Children of 1997", comprising 88% of births in Hong Kong in April and May 1997. We also assessed whether these lifestyle attributes mediated any associations between paternal smoking in infancy and child BMI, using the criteria of Baron and Kenny.

Results: Of the original 8,327 cohort members, as of 30 June 2010, 7,933 were alive, had not withdrawn and were living in Hong Kong, 7,902 had non-smoking mothers and of these, 2,219 had complete information on childhood diet, physical activity, television watching and BMI at about 11 years old and were included in the analysis. Low family SEP was associated with poorer diet and more TV watching. Children of paternal smokers watched more TV but had similar diets and levels of physical activity to others. Adjustment for diet, TV watching and physical activity did not change the association of paternal smoking with child BMI.

Conclusions: The prospective association of paternal smoking with higher child BMI was not mediated by childhood diet and activity, suggesting it may be biologically-mediated rather than socio-economically confounded.

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Ab113
Physical activity for children in special school environments

C Sit[1], T McKenzie[2], E Cerin[1], A McManus[1]
[1]Institute of Human Performance, HKU
[2]School of Exercise and Nutritional Sciences, San Diego State University, USA

Background: Physical inactivity is a serious public health problem. Little, however, is known about children's physical activity (PA) in different settings within special school environments and how PA is associated with contextual characteristics.

Aims: The main aim of this study was to examine the role that special school environments play in providing PA for children with disabilities during school time. Specifically, we objectively measured children's PA in both structured (i.e., physical education) and unstructured (i.e., free play) settings, and examined its association with potentially modifiable contextual variables.

Methods: We used a modification of the System for Observing Play and Recreation in Community (SOPARC) to document children's PA during physical education lessons and during unstructured (i.e., recess, lunch, and before and after school) settings. Trained observers assessed 67 activity target areas in 10 special schools over three months, making 400 visits to the areas and coding 7,047 children. When observed, each child was coded as sedentary, walking, or vigorous using a mechanical counter. Observers simultaneously coded the contextual characteristics of the environment, including its accessibility, usability, and presence of supervision, organised activities, and equipment.

Results: Children engaged in proportionally more moderate-to-vigorous physical activity (MVPA) at recess (52.1%) and lunch (55%) than during PE (44.3%), before school (43.6%) and after school (46.7%). Overall when visited, 47.1% of all target areas were accessible, 92.3% were usable, 18.1% were supervised, 2.8% provided organised

activities, and 32.5% were equipped. Higher levels of accessibility and supervision during leisure time occurred primarily during recess. Children were more active where the activity areas were supervised and had organised activities.

Conclusions: These children with disabilities were frequently sedentary at school, but during recess and lunch periods had more MVPA than during before and after school and PE. Children's leisure time activity levels were associated with modifiable contextual variables.

Implications: Staff development emphasising physical activity might encourage school and health professionals to make activity areas accessible more frequently, increase direct supervision, and provide structured innovative games and activities.

Ref. No. HHSRF: 05060651

Ab116
Development and validation of measures to study the effects of the built environment on walking in Hong Kong senior residents using a convenience sample

E Cerin[1], DJ Macfarlane[1], HP Sit[1], SY Ho[2], JM Johnston[2], KL Chow[3], WM Chan[4], MC Cheung[4], KS Ho[4]
[1]Institute of Human Performance, HKU
[2]School of Public Health, HKU
[3]Sau Po Centre on Aging, HKU
[4]Elderly Health Service, DH

Background: The number of senior residents (aged 65+ years) in Hong Kong is projected to reach 2.3 million in 2013, which corresponds to 27% of the total population. Increases in the proportion of seniors require that special attention be given to their health. Regular engagement in physical activity can contribute to healthy aging. There is evidence that specific aspects of the built environment play a decisive role in facilitating residents' walking for different purposes.

Aims: The aims of this project were to develop/adapt and validate interviewer-administered self-report measures of (a) perceived neighbourhood environmental characteristics related to walking; and (b) within- and outside-neighbourhood walking for Chinese-speaking seniors.

Methods: The Neighborhood Environment Walkability Scale (NEWS-A) and the RESIDE's Neighborhood Physical Activity Questionnaire were interviewer-administered to 484 members of the EHCs residing in one of four selected Hong Kong districts varying in walkability and socio-economic status. Ninety-four participants wore an accelerometer, kept a diary of walks, and were re-administered the instruments. Attributes of the participants' neighbourhood environment were measured objectively via geographical maps and environmental audits.

Results: Most perceived aspects of the environment were significantly associated with objectively-measured matching environmental characteristics and walking for different purposes. Access to and availability of services, easy access to residential entrance and presence of sitting facilities in the neighborhood emerged as potential determinants of walking for transport in Hong Kong seniors. The presence of greenery and attractive sights emerged as a potential facilitator of recreational walking. The same held true for access to services, street connectivity, indoor places for walking and bridge/overpass connecting services. In contrast, human/motorised traffic and physical barriers to walking were identified as possible deterrents of recreational walking.

Conclusions and implications: The Chinese versions of the NEWS-A and walking-section of the NPAQ are reliable and valid instruments of perceived neighbourhood walkability and walking behaviour, respectively The findings from the validation component of the project suggest that the creation of local environments supportive of walking may help Hong Kong older adults maintain an active and, hence, healthier lifestyle. Of particular importance is the presence of conveniently-located services, sitting facilities, easy access of residential entrances, indoor places for walking and green areas.

Ref. No. HHSRF: 04060671

Improving Health and Recognising Excellence

Nutrition

Ab185
Is exercise protective against influenza-associated mortality?

CM Wong[1], HK Lai[1], CQ Ou[1,2], SY Ho[1], KP Chan[1], TQ Thach[1], L Yang[1], YK Chau[1], TH Lam[1], AJ Hedley[1], JSM Peiris[3]
[1]School of Public Health, HKU
[2]Department of Biostatistics, School of Public Health and Tropical Medicine, Southern Medical University, PRChina
[3]Department of Microbiology, HKU

Background: Little is known about the effect of physical exercise on influenza-associated mortality

Methods: We collected information about exercise habits and other lifestyles, and socioeconomic and demographic status, the underlying cause of death of 24,656 adults (21%aged 30–64, 79% aged 65 or above) who died in 1998 in Hong Kong, and the weekly proportion of specimens positive for influenza A (H3N1 and H1N1) and B isolations during the same period. We assessed the excess risks (ER) of influenza-associated mortality due to all-natural causes, cardiovascular diseases, or respiratory disease among different levels of exercise: never/seldom (less than once per month), low/moderate (once per month to three times per week), and frequent (four times or more per week) by Poisson regression. We also assessed the differences in ER between exercise groups by case-only logistic regression.

Results: For all the mortality outcomes under study in relation to each 10% increase in weekly proportion of specimens positive for influenza A+B, never/seldom exercise (as reference) was associated with 5.8% to 8.5% excess risks (ER) of mortality (P,0.0001), while low/moderate exercise was associated with ER which were 4.2% to 6.4% lower than those of the reference (P,0.001 for all-natural causes; P = 0.001 for cardiovascular; and P = 0.07 for respiratory mortality). Frequent exercise was not different from the reference (change in ER 20.8% to 1.7%, P =0.30 to 0.73).

Conclusions: When compared with never or seldom exercise, exercising at low to moderate frequency is beneficial with lower influenza-associated mortality.

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Ab214
Out-of-school study time and childhood obesity: evidence from Hong Kong's "Children of 1997" birth cohort

LA Mitchell-Wong[2], GM Leung[1], C Yau[1], TH Lam[1], CM Schooling[1]
[1]Life Course and Lifestyle Epidemiology Group, School of Public Health, HKU
[2]MPH programme, School of Public Health, HKU

Background: There is a burgeoning epidemic of childhood adiposity, with potentially detrimental life long consequences for health. In Hong Kong a focus on academic work could be fuelling this epidemic. We assessed if out-of-school study time was i) associated with adiposity in children, or ii) resulted in a time trade-off with other childhood developmental activities.

Methods: We used linear and logistic regression to estimate the adjusted association of out-of-school study time with clinically assessed childhood BMI z-score, relative to the World Health Organization 2007 growth references, and overweight or obesity status, relative to the International Obesity Task Force guidelines, at ~11 years, in a cross-sectional analysis of a large population-representative Hong Kong Chinese birth cohort comprising 88% of births in April and May 1997. Out-of-school study time was obtained from a parental self-administered questionnaire and defined as homework plus tutorial lessons. We used multiple imputation for missing exposures and confounders.

Results: Of the original 8,327 cohort members, as of 30 June 2010, 7,933 were alive, had not withdrawn and were living in Hong Kong. Of these, 3,682 completed the questionnaire, and 6,796 also had clinically measured BMI at 11 years. There was a positive association between out-of-school study and BMI z-score (0.012 per study hour per day, 95% confidence interval (CI) 0.004 to 0.02) adjusted for sex, mother's place of birth, highest parental education, sleep duration, playing sport, watching television, playing video/computer games and playing with friends. There was a time trade-off between out-of-school study and sleep, those with more than the median number of hours (3.5) of out-of-school study per day were more likely to have short

sleep (odds ratio 1.30, 95% CI 1.11 to 1.53 for ≤ 8 hours per night), but not between out-of-school study and other activities.

Conclusions: This is the first study to assess the impact of out-of-school study on the health of children in Hong Kong. Out-of-school study time was positively associated with adiposity. In developed Asian settings, an emphasis on academic work may be combined with wesrernisation of diet, to contribute to childhood obesity.

Ab257
Effect of nurse follow-up dietary intervention (NFDI) on dietary behaviour and disease related knowledge in post myocardial infarction patients in Hong Kong: a randomised controlled trial

KFV Mok[1], SMA Tsang[2], WHJ Sit[2], TL Cheng[2], CS Chiang[2]
[1]Coronary Care Unit, QEH
[2]PolyU

Aims: The aim of this study was to examine the effects of a nurse led follow-up dietary intervention programme on dietary modification behaviour, knowledge level of myocardial infarction and coronary artery disease, and physiological risk parameters in patients with coronary artery disease in Hong Kong.

Methods: A randomised controlled trial was conducted. Coronary artery disease patients with diagnosed myocardial infarction (n=82) who met the sampling criteria in a regional hospital, were randomly assigned to either an intervention group (the Nurse Follow-Up Dietary Intervention (NFDI) + conventional treatment) or control group (the conventional treatment). Knowledge of coronary artery disease risk factors identification, dietary modification behaviour and blood lipid profile were assessed to evaluate the programme effect. Data collection was conducted at the baseline (T_1), 1 week post intervention (T_2), and 3 months post intervention (T_3).

Results: Patients in the intervention group demonstrated a significantly a better dietary modification behaviour in a reduction in high fat and high salt intake and increased consumption of Mediterranean type diet. The majority of these impacts were maintained at 3 months after the intervention. The effects of the programme on the knowledge level of myocardial infarction and lipid profile were not confirmed.

Conclusions: A nurse led follow-up dietary intervention programme has a positive impact on patients with coronary artery disease. Through participating in the NFDI rehabilitation programme, coronary artery disease patients after myocardial infarction demonstrated significantly better dietary behaviour and sustained 3 months after the intervention. Although the majority of the lipid profile did not show significant difference between control and intervention group, the increase in cardiac-protective factors-High Density Lipoproteins is an encouraging sign for further studies.

Implications: This study raises the attention of the importance of nurse roles in cardiac rehabilitation. This study might generate momentum and right direction for the development of evidence-based cardiac rehabilitation nursing in Hong Kong.

Ab01
Outreach dental caries control service for kindergarten children

CH Chu, ECM Lo
Faculty of Dentistry, HKU

Background: A recent government oral health survey reported dental decay (caries) was prevalent among 5-year-old children in Hong Kong. About half (49.4%) of the preschool children had caries experience. Most of them had never visited a dentist and almost all dental caries were left untreated. Clinical studies showed that silver diamine fluoride (SDF) is effective in preventing and arresting dental caries among young children.

Aims: This project aims to set up an outreach dental service to prevent and to control dental caries of kindergarten children in Hong Kong.

Methods: Kindergartens were invited to join this service. Invitation letters describing this project aims and procedures were sent to parents of kindergarten children. Parental consents and parental questionnaire were collected. Dental health education was provided. Oral examination was performed in the kindergarten by trained dentists. SDF was applied to decayed teeth to arrest caries progression. Children who required restoration or extraction were referred to community dental clinics. Kindergarten teachers were trained to deliver oral health education to the children. Follow-up will be performed every six months until the children enter primary schools where they can join the government school dental care service.

Results: Twenty kindergartens were recruited. Many parents gave consent to allow their children to join this project. We provided oral health education to and screened a total of 1,954 kindergarten children with parental consent to participate in this outreach dental service. Among these children there were 860 children with dental decay and the maximum number of decayed teeth was 19 out of the 20 primary teeth. The caries prevalence was 44%. They all received professional fluoride (SDF) therapy to arrest the caries progression. No complication or adverse side-effect has been reported so far. Training of kindergarten teachers were provided so that they could reinforce the message of oral hygiene in their teaching. The oral health education to preschool children and the training of Kindergarten teachers were well received by the children and teachers respectively.

Conclusions: An outreach dental caries control service has been successfully set up. It has been well received by the kindergarten teachers, and children and their parents.

Ab56
Novel and conventional assays for assessing risk for dental caries

XL Gao, CJ Seneviratne, ECM Lo, CH Chu, LP Samaranayake
Faculty of Dentistry, HKU

Background: Dental caries (tooth decay) is a highly prevalent chronic infectious disease. *Streptococcus mutans* commonly present in saliva is one of the major aetiological agents of the disease, hence used as a benchmark indicator for caries risk assessment.

Aims: This study aimed to comparatively evaluate and validate a novel immunoassay and a conventional assay for detecting salivary *Streptococcus mutans* in a pediatric cohort.

Methods: After obtaining ethical approval from the HKU Institutional Review Board, 190 children aged 3-4 years were recruited from three kindergartens representing low, moderate, and high socio-economic groups in Hong Kong. The abundance of *Streptococcus mutans* in saliva samples was analysed with three assay systems viz. a conventional culture-based assay (Dentocult SM), a novel immunoassay system based on monoclonal antibody technology (Saliva-Check *mutans*), and a Taqman real-time PCR assay, which was taken as a gold standard.

Results: The immunoassay accurately categorised salivary samples into two groups with high ($\geqq 5X10^5$ CFU/ml) and low (<$5X10^5$ CFU/ml) *Streptococcus mutans* levels. The sensitivity/specificity was 97.6%/90.6%. The conventional culture-based assay reached a reasonably high sensitivity/ specificity (92.8%/81.3%) in identifying children with moderate ($\geqq 10^4$ CFU/ml) *Streptococcus mutans* level. However, its sensitivity/specificity in selecting children with high ($\geqq 10^5$ CFU/ml) and very high (>10^6 CFU/ml) *Streptococcus mutans* levels were relatively low (78.7%/79.8% and 25.8%/91.8%, respectively).

Conclusions: The monoclonal antibody-based immunoassay, which accurately and rapidly determines *Streptococcus mutans* abundance in saliva, could be useful for chairside assessment of patients' caries risk.

Implications: This study provides evidence on the validity of a novel, simple and inexpensive immunoassay system in determining the *Streptococcus mutans* abundance in saliva. This technology can be used as a caries risk assessment tool for optimised dental treatment planning and cost-effective control of dental caries, the most common chronic disease of childhood.

Oral health

Ab02
Pathogenesis of the pandemic swine-origin influenza H1N1 virus (H1N1pdm) in humans: studies of viral tropism and host response in primary differentiated human respiratory epithelial cell cultures *in vitro* and in *ex vivo*

MCW Chan[1], RWY Chan[1,2], SMY Lee[1], CY Cheung[1], SW Tsao[3]
JM Nicholls[2], JSM Peiris[1]
[1]Department of Microbiology, HKU
[2]Department of Pathology, HKU
[3]Department of Anatomy, HKU

Background: Novel pandemic influenza H1N1 (H1N1pdm) virus of swine-origin causes mild disease but occasionally leads to acute respiratory distress syndrome and death.

Aims: It is important to understand the pathogenesis of this new disease in humans.

Methods: We compared the virus tropism and host responses elicited by pandemic H1N1pdm (A/HK415742/2009) and seasonal H1N1 (A/HK54/1998) influenza virus in *ex vivo* cultures of human conjunctiva, nasopharynx, bronchus and lung and in *in vitro* cultures of human nasopharyngeal, bronchial and alveolar epithelial cells.

Results: We found comparable replication and innate immune host responses in seasonal and pandemic H1N1 viruses. Pandemic H1N1pdm virus differs from seasonal H1N1 influenza virus in its ability to replicate in human conjunctiva suggesting subtle differences in receptor binding profile and highlighting that the potential role of the conjunctiva as an additional route of infection with H1N1pdm. The greater viral replication competence in bronchial epithelium at 33°C may also contribute to the slight increase in virulence of the pandemic influenza virus. In contrast with highly pathogenic influenza H5N1 virus, pandemic H1N1pdm does not differ from seasonal influenza virus in its intrinsic capacity for cytokine dysregulation. The global gene expression profile revealed by microarray analysis of primary human alveolar type I-like pneumocytes infected with the H1N1pdm and seasonal H1N1 viruses did not show pathways that were differentially activated by H1N1pdm virus. However, a number of genes that are down-regulated by seasonal H1N1 virus were unaffected by H1N1pdm and the significance of these differences are under investigation.

Conclusions: Collectively, these results suggest that pandemic H1N1pdm virus differs in modest but subtle ways from seasonal H1N1 virus in its intrinsic virulence for humans, findings that are in accord with the epidemiology of the pandemic to date. These findings are relevant for understanding transmission and therapy.

Ref. No. RFCID: HSI-Lab-15

Ab03
Effect of vitamin B_2 in the treatment of human influenza H5N1 virus infection: studies *in vitro* and *in vivo*

RWY Chan[1,2], SSR Kang[1], WCL Yu[1], JSM Peiris[1], MCW Chan[1]
[1]Department of Microbiology, QMH, HKU
[2]Department of Pathology, QMH, HKU

Background: Highly pathogenic avian influenza H5N1 virus is entrenched in poultry and continues to transmit zoonotically to humans posing a pandemic threat. In case of a pandemic, time will be required before a safe and reliable vaccine becomes available. Thus there is a need for adjunctive therapies that may help modulate the severity of the disease. Human H5N1 disease causes unusual disease severity and high mortality, and clinical syndromes have been previously suggested to associate with cytokine dysregulation. Thus, immunomodulator agents could be a promising alternative strategy for the treatment. We hypothesise that vitamin B_2 can be a potential candidate to alleviate the pathology of human H5N1 disease by modulating the host innate immune responses.

Methods: The viral replication and host innate immune responses of primary human peripheral blood derived macrophage and type I-like pneumocyte infected with avian influenza H5N1 (A/HK483/97) and seasonal influenza H1N1 (A/HK/54/98) virus with or without vitamin B_2 (20μg/ml) treatment were compared. Influenza virus replication was assessed by virus yield titration (TCID$_{50}$) in MDCK cells. The mRNA and protein level of cytokine and chemokine induced by influenza viruses was studied by quantitative RT-PCR and ELISA, respectively.

Results: We have shown that vitamin B_2 is effective in suppressing the hyper-induction of cytokine upon influenza H5N1 virus infection *in vitro* in alveolar epithelial cells and peripheral blood derived macrophages without affecting the virus replication kinetics. In the alveolar epithelial cells, the mRNA levels of IP-10, interferon beta, RANTES and IL-6 were significantly up-regulated by influenza H5N1 viruses when compared to influenza H1N1 virus, especially IFN-ß ($p<0.05$). By vitamin B_2 administration regimes, the hyper-induced mRNA and protein levels of IP-10, IFN-ß, RANTES and IL-6 in influenza H5N1 viruses infected cells were significantly suppressed. Similar cytokine suppression pattern was seen in the experiments with peripheral blood derived macrophages. Interestingly, the hyper-induced IFN-ß gene in the influenza H5N1 virus infected macrophages was not suppressed by vitamin B_2 treatment.

Conclusions: The apparent cytokine and chemokine modulating effect of vitamin B_2 infers quite strongly on the beneficial effect of vitamin B_2 in cytokine dysregulating pathology. Understanding the host interaction with influenza A virus and the role of vitamin B_2 as an immunomodulatory agents in human H5N1 disease can provide important insight into the mechanism of pathogenesis and to identify novel therapeutic strartegies for the treatment of severe human influenza H5N1 disease in combination of antivirals.

Ref. No. RFCID: 08070762

Ab06
Risk of active tuberculosis in patients with rheumatoid arthritis in Hong Kong

LS Tam[1], CC Leung[2], SK Ying[3], GK Lee[4], CW Yim[5], YY Leung[6],
EW Kun[7], KK Wong[8], EK Li[1]
[1]The Department of Medicine & Therapeutics, CUHK
[2]Tuberculosis and Chest Service, DH
[3]Department of Medicine, PMH
[4]Department of Medicine, UH
[5]Department of Medicine, UCH
[6]Department of Medicine, NDH
[7]Department of Medicine, TPH
[8]The Centre for Health Education and Health Promotion, CUHK

Background: Tumour necrosis factor (TNF) blockers have been used in patients with refractory rheumatoid arthritis (RA) in Hong Kong since 2004, and their application in ankylosing spondylitis, psoriatic arthritis, and RA is increasing. Data on the role of TNF blockers on the tuberculosis (TB) incidence in RA patients from an area of high TB burden is lacking. Moreover, risk factors associated with TB in RA patients remained unclear.

Aims: To elucidate the incidence rate and relative risk of TB in patients with RA compared to the general population in Hong Kong between 2004-2008, and to assess whether this risk is associated with exposure to TNF blockers after adjusting for other known risk factors.

Methods: We reviewed all the medical records of RA patients to determine the standardised incidence ratio (SIR) of TB in RA patients. Independent explanatory variables associated with active TB in RA were ascertained using the Cox regression model.

Results: A total of 2441 RA patients followed at the 5 centres were recruited. The mean age at the start of follow up was 56 ± 14 years. The median follow-up duration was 6,616 and 185 patient-years for the TNF naive and TNF treated groups, respectively. Compared to age- and sex-matched population controls, the SIR of active TB in RA was significantly increased (SIR for TNF naïve RA: 2.35, 95% CI 1.17-4.67, $p=0.013$, SIR for TNF treated RA: 34.92, 95% CI 8.89-137.20, $p<0.001$). Independent explanatory variables associated with an increase risk of active TB included older age at study entry (RR 1.05, $p=0.013$) a past history of pulmonary TB (RR 5.48, $p=0.001$), extra-pulmonary TB (RR 16.45, $p<0.001$), Felty's syndrome (RR 43.84, $p=0.005$), prednisolone > 10mg daily (RR 4.44, $p=0.009$) and the use of TNF blockers (RR 12.48, $p<0.001$)

Conclusions: Exposure to TNF blockers remained to be an independent risk factor for TB in RA after adjusting for other known risk factors.

Implications: We demonstrated that local RA patients are at increased risk of TB, routine screening for latent TB infection and prophylaxis in all RA patients or patients to be started on immunosuppressants, especially those who may require moderate dose of prednisolone >10mg daily would be justified.

Ref. No. RFCID: 08070442

Ab14
Comparison of tuberculin skin test with both T-SPOT. TB test and QuantiFERON-TB Gold test in the targeted screening of latent TB infection among HIV-infected persons in Hong Kong

CK Chan[1], KCW Chan[2], WC Yam[3], MP Lee[4], KH Wong[2], PL Ho[3], CM Tam[1], CC Leung[1]
[1]TB and Chest Service, CHP, DH
[2]Special Preventive Programme, CHP, DH
[3]Carol Yu Centre for Infection and Department of Microbiology, QMH, HKU
[4]Department of Medicine, QMH

Background: Patients co-infected with human immunodeficiency virus (HIV) and tuberculosis (TB) are at risk of developing active TB.

Methods: T-Spot.TB (T-Spot), QuantiFERON-TB Gold In-Tube (QFT) and tuberculin skin test (TST) were compared among HIV-infected subjects without history of active TB or recent contact history. All subjects were followed up for active TB or death till March 31, 2010.

Results: From 1 December 2006 to 31 August 2009, 102 HIV-infected subjects of mean age 42.9 (range: 20-76) years were successfully recruited. Eighty-nine (86.3%) were males, and 64 (62.7%) had a BCG scar. The median CD4 count and viral load were 382 (range: 99-765) per μl and below 400 copies (range: <400 – 520,000) per ml. The positive rates for TST (5mm cutoff), T-Spot and QFT were 7/102 (6.9%), 6/99 (6.1%) and 5/102 (4.9%) respectively, well below the estimated background latent TB infection prevalence of 27.6-35.0%. Agreement was poor with kappa of 0.259 (TST vs T-Spot), -0.061 (TST vs QFT), and -0.051 (T-Spot vs QFT). Only two positive results were concordant between TST and T-Spot, with none for QFT. QFT, but not TST or T-Spot, was significantly affected by CD4 count. Gender, age, BCG scar, and viral load did not exert any significant influence. No TB case was detected from the whole cohort after follow-up for 175.5 person-years.

Conclusions: The three existing tests for LTBI gave fewer than expected, and discordant, positive results among HIV-infected subjects without active TB, possibly indicating their limited sensitivity for remote infections.

Ref. No. RFCID: CHP-PH-04

Ab20
Genetic association between a chemokine gene CXCL10 and susceptibility to tuberculosis

NLS Tang[1,7], HPY Fan[1], KC Chang[2], JKL Ching[1], KPS Kong[1], WW Yew[3], KM Kam[4], CC Leung[4], CM Tam[4], J Blackwell[5], RCY Chan[6]
[1]Department of Chemical Pathology, CUHK
[2]Department of Health, Tuberculosis and Chest Unit, GH
[3]HA
[4]DH
[5]Cambridge Institute of Medical Research, University of Cambridge, UK
[6]Department of Microbiology, CUHK
[7]Laboratory for Genetics of Disease Susceptibility, CUHK

Background: Chemokines are known to be important players in the innate immune response to pathogens of the respiratory tract. Previous studies have shown that the activation of chemokine CXCL-10 was prominent in various infectious diseases.

Aims: In this study, we examined the variants in the promoter of CXCL-10 and explored their role in the susceptibility to tuberculosis.

Methods: We sequenced the promoter of CXCL-10 (1.8kb) in 24 healthy Chinese individuals to identify genetic polymorphisms, from which three tagging SNPs were selected in the CXCL-10 promoter (-1447A>G, -827G>A, -135G>A). A total of 240 tuberculosis patients and 176 healthy Chinese subjects were recruited, and genotyping of the SNPs were performed by PCR-RFLP. Chi-square and Fisher's exact tests were used to examine genetic associations with the disease.

Results: The promoter SNP -135G>A (minor allele frequency=0.1) showed a moderate association with tuberculosis in both genotypic analysis (P=0.01) and allelic analysis (P=0.03). The A allele in SNP -135G>A appeared to have a protective effect with the odd ratio of 0.51 (0.29 – 0.91) for heterozygotes and homozygotes carriers of A allele. However, the other tagging SNPs (-1447A>G, -872G>A) were not associated with tuberculosis.

Conclusions: A new potentially protective SNP -135G>A for tuberculosis was identified in the gene promoter of the chemokine CXCL-10. As this SNP is located at 14bp upstream of a NF-kB binding site on the CXCL-10 gene, it might account for the observed susceptibility to tuberculosis. It is interesting that the same allele has been shown to enhance CXCL-10 transactivation in Hepatitis B virus infection. Our results expanded the clinical significance of this CXCL-10 promoter SNP to tuberculosis.

Ref. No. RFCID: CUHK-BS-009

Ab23
Human rhinovirus is the most important respiratory pathogen associated with asthma exacerbation in Hong Kong children

TF Leung[1], MY To[1], ACM Yeung[2], GWK Wong[1], PC Ng[1], PKS Chan[2]
[1]Department of Paediatrics, PWH, CUHK
[2]Department of Microbiology, CUHK

Background: Up to 80% of asthma exacerbations in Caucasian children are associated with viral upper respiratory infections. Emerging evidence also suggests human rhinovirus (HRV) to play a crucial pathogenic role in childhood asthma exacerbation. However, such virological data is limited for Asian children.

Aims: This study aimed to elucidate the epidemiology of respiratory infections in Hong Kong children who were hospitalised for asthma exacerbation.

Methods: This case-control study recruited 209 children aged 3-18 years with asthma exacerbations and 77 controls with stable asthma. Asthma diagnosis was made according to American Thoracic Society criteria. Subjects older than 6 years performed online exhaled nitric oxide measurement followed by pre-bronchodilator spirometry. Subjects' nasopharyngeal aspirates were subjected to five groups of nested multiplex polymerase chain reactions that target 20 respiratory viruses and atypical bacteria.

Results: Respiratory pathogens were detected in 105 (51.0%) subjects. The presence of any respiratory pathogen was associated with asthma exacerbation (P<0.001). Specifically, HRV infection was more common among patients with asthma exacerbation (26.2% versus 13.0%; P=0.018). Co-infections with ≥ 2 organisms was also associated with asthma exacerbation (10.7% versus 2.6%; P=0.030). However, none of these infections was associated with severity of asthma exacerbation (P>0.15 for all). Patients with asthma exacerbation caused by respiratory viruses were younger than those without identifiable viral infections (P<0.05). This finding was attributed mainly to RSV (P<0.005), and influenza A and human metapneumovirus infections (P<0.05 for both). There was no difference in age distribution between cases and controls with other infections including HRV, or with co-infections. During peak HRV season in winter of 2007/08, 46.4% of children with asthma exacerbations were positive for this virus.

Conclusions: Respiratory viral infections are commonly detected in Hong Kong children hospitalised for asthma exacerbation, with HRV being the most important pathogen in our patients. Our data suggests that viral infection is a triggering factor, but does not correlate with the severity, of childhood asthma exacerbations.

Ref. No. RFCID: 05050202

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Ab24
A community study of lung function in Hong Kong Chinese pre-school children using incentive spirometry

TF Leung[1], TC Liu[1], PS Wong[2], KY Ho[1], JCY Pang[1], YY Kwok[1]
YYF Ho[1], HY Sy[1], AM Li[1], GWK Wong[1], PC Ng[1]
[1]Department of Paediatrics, PWH, CUHK
[2]Department of Statistics, CUHK

Background: Spirometry is a standard tool in assessing childhood respiratory diseases. The correct interpretation of lung function abnormalities necessitates well-validated spirometric reference standards, but such data is lacking in Asian preschoolers.

Aims: This study established spirometric references in local young children, and delineated the effects of demographic and early-life factors on these references.

Methods: This abstract presented interim analysis of an ongoing population-based observational study in Chinese children attending kindergartens. Subjects' parents completed a validated questionnaire on demographics, environmental exposures and respiratory health status. These young children performed incentive spirometry to provide forced expiratory parameters.

Results: Of 474 children from 7 kindergartens, 31 (6.5%) and 49 (10.3%) had physician-diagnosed asthma and current wheeze, respectively. These young children were excluded from analysis. The mean (SD) age of the remaining 413 children was 4.3 (1.1) years and 56.4% were ≤4 years old. Their mean (SD; range) height was 107.4 (7.7; 86-128) cm. Three hundred and eighty-six (93.5%) children provided evaluable spirometric data. Compared with girls, boys had higher forced expiratory volume in 0.5-second ($FEV_{0.5}$), $FEV_{0.75}$, FEV_1, forced vital capacity (FVC) and peak expiratory flow (P=0.025-0.001) whereas $FEV_{0.5}$/FVC was independent of gender (P=0.063). All parameters except $FEV_{0.5}$/FVC were height-dependent (P<0.001). Current maternal smoking was associated with lower forced expiratory volumes (P=0.007-0.009), which were stronger than smoking exposures during pregnancy or infancy. Being born in Hong Kong (91.3%) was also associated with lower forced expiratory volumes (P=0.006-0.017). Breastfeeding ever or family history of asthma did not affect spirometric indices (P>0.15 for all).

Conclusions: Interim analysis of our study data suggests that forced expiratory volumes of young Hong Kong Chinese children are affected by gender, height, passive smoke exposure and place of birth. Our group expects to establish the normograms and reference equations of spirometric references for local preschoolers by the end of this year.

Ref. No. HHSRF: 06070261

Ab25
Viral loads and duration of viral shedding in adult patients hospitalised with influenza

N Lee, PKS Chan, DSC Hui, TH Rainer, E Wong, KW Choi, GCY Lui, BCK Wong, RYK Wong, WY Lam, IMT Chu, RWM Lai, CS Cockram, JJY Sung
CUHK

Background: To characterise viral loads and factors affecting viral clearance in severe influenza.

Methods: One-year prospective, observational study on consecutive adults hospitalised with influenza. Nasal-and-throat swabs were collected at presentation, then daily until one week post-symptom-onset. Real-time RT-PCR for viral RNA concentration (VC) and virus isolation were performed. VC was analysed using multiple linear/logistic-regressions, or mixed-effect-models.

Results: 147 in-patients with influenza A (H3N2) infection were studied (age,72±16 years). Their VC at presentation positively correlated with symptom-scores, and was significantly higher than time-matched, outpatient controls. Patients with major comorbidities had high VC even when presenting >2 days post-onset [5.06±1.85vs3.62±2.13 log10copies/mL, p=0.005; ß+0.86(95%CI=+0.03-+1.68)]. VC showed non-linear decline with time; 26% oseltamivir-treated, and 57% untreated patients remained RNA+ at one-week. Oseltamivir started on/before symptom day(d) four was independently associated with accelerated VC decline [mean(S.E.)=-1.19(0.43) and -0.68(0.33), for treating on d1 and d2-3 respectively; p<0.05],and RNA-negativity

at one-week [OR(95%CI)=0.10(0.03-0.35) and 0.30(0.10-0.90), for treating on d1-2 and d3-4 respectively]. Conversely, major comorbidities and systemic corticosteroid use for asthma/COPD exacerbations were associated with slower viral clearance. Viral RNA-negativity was associated with shorter hospital stay (7.0 vs 13.5 days; p=0.001).

Conclusions: Patients hospitalised with severe influenza have more active and prolonged viral replication. Weakened host-defences slow, whereas antivirals started within days 1-4 of illness, enhance viral clearance.

Implications: A more aggressive approach on diagnosis, treatment, and infection control is needed in severe influenza. Patients presenting with severe respiratory illness should receive prompt influenza testing, followed by antiviral treatment as soon as possible and even beyond 2 days from onset for virus suppression. Precautions to prevent transmission should be extended beyond 5 days of illness in hospitalised patients. Our study provided timely data to optimise management of severe influenza during the pandemic in 2009.

Ref. No. RFCID: 06060282

Ab39
Physiological fitness and transmission potential of multi-drug resistant Mycobacterium tuberculosis clinical isolates in Hong Kong

EWC Chan[1], MTK Au[1], RWM Lai[1], CW Yip[2], KM Kam[2], RCY Chan[1]
[1]Department of Microbiology, PWH , CUHK
[2]Public Health Laboratory Centre

Background: This study evaluated the infectivity and transmission potential of multi-drug resistant Mycobacterium tuberculosis (MDR-MTB) strains by determining (i) whether resistance developed at a physiological cost which might render them less capable of surviving environmental stress and infecting human host, and (ii) the degree of genetic relatedness shared by resistant strains and the corresponding epidemiological features of cluster organisms, which indicate the extent by which they spread in the community.

Methods: The relative growth rates of selected isolates were measured using the MGIT system and compared to that of drug-sensitive strains.

Results: Our data showed that their average initial growth rate, measured within 7 days of inoculation, was inversely proportional to the number of mutations they harbored in key resistance genes, with strains carrying 5 mutations growing at a rate 46% slower than that of the wild type. These findings suggested that resistance gene mutations in MTB imposed a range of physiological cost characterised by reduced growth fitness. However, results of epidemiological typing showed that 34% of the 402 MDR-MTB isolates analysed exhibited close genetic relationship with at least one other strain in the group, indicating that the mutation fitness cost did not significantly affect the ability of MDR-MTB to transmit between human hosts and cause infection. Importantly, the identification of five major clusters which contained a total of 50 strains strongly suggests that infection due to dissemination of 'parental' MDR-MTB clones is not uncommon. On the other hand, the majority of test strains displayed a unique genetic profile, indicating that MDR-MTB might also emerge independently through drug selection within individual patient.

Conclusions: The DNA fingerprinting and growth fitness data of local resistant isolates may be used for documenting the genetic identities, predicting transmission potential, and tracing the dissemination routes of MDR-MTB isolates in the community.

Ref. No. RFCID: 06060132 / 06060092

Ab44
Prevalence of efflux-mediated rifampicin resistance in Mycobacterium tuberculosis clinical isolates

RCY Chan, EWC Chan, MTK Au
Department of Microbiology, PWH, CUHK

Background: Rifampicin is one major ingredient in the cocktail-regimen used in treatment of *Mycobacterium tuberculosis* (MTB)

infection. Although mutations in the *rpoB* gene are considered the basis of rifampicin resistance, we noted that a significant proportion of local resistant cases could not be attributed to mutations. Alternative mechanisms such as drug efflux have been proposed.

Aims: In order to evaluate the role of drug efflux mechanisms in mediating rifampicin resistance in MTB, we examined the prevalence of efflux activities in rifampicin resistant isolates using three efflux inhibitors: reserpine, carbonyl cyanide chlorophenylhydrazone and verapamil.

Methods: Forty-two rifampicin resistant and nine drug susceptible MTB clinical isolates were studied. The minimum inhibitory concentration (MIC) values for rifampicin were determined in the presence and absence of efflux inhibitors. The magnitudes of MIC reduction for each efflux inhibitor and the prevalence of efflux-mediated resistance were examined.

Results: We found that among the three efflux inhibitors tested, significant MIC reduction, $\geq$2-fold MIC decrease, was observed only for verapamil. 61% (31/51) of the test isolates had an MIC reduction between 2 to 8-fold in the presence of verapamil. This verapamil-sensitive efflux-mediated MIC reduction effect was much more apparent in rifampicin resistant isolates than the drug susceptible controls: 71% (30/42) versus 11% (1/9). Likewise, this phenomenon was more prevalent in isolates resistant to 3-5 anti-tuberculosis drugs than isolates resistant to 1-2 drugs: 77% (24/31) versus 55% (6/11).

Conclusions: This data support the notion that drug efflux systems contribute significantly to rifampicin resistance in MTB clinical isolates and highlight the need for determining the extent by which these systems contribute to resistance to other anti-tuberculosis drugs.

Implications: Knowledge of the prevalence of efflux-mediated resistances in drug-resistant MTB clinical isolates enables us to better understand the mechanisms of drug resistance in this organism and allow the development of more effective diagnostic and therapeutic strategies for the management of infections caused by drug-resistant MTB.

Ref. No. RFCID: 08070292

Ab45
Small regulatory RNAs in *Mycobacterium tuberculosis*

MTK Au, EWC Chan, RCY Chan
Department of Microbiology, PWH, CUHK

To survive and proliferate in the host, *Mycobacterium tuberculosis* (MTB) must cope with the sub-optimal and stressful growth conditions during the process of infection by adjusting its gene expression patterns accordingly. An elucidation of the gene expression regulators in these adaptive responses will be crucial in the understanding of the survival and pathogenicity of MTB in the host environment. In other bacterial pathogens, small RNAs have been shown to play a role as key regulators in adaptive responses during infection. In MTB, however, despite the predication of a complex array of putative small RNA-coding genes in the genome by in silico means, there is no experimental evidence to date that supports the existence of small RNA-mediated regulatory functions in this important pathogen. We propose to analyse the expression of each of the putative MTB small RNA-coding genes by measuring the RNA transcript level of each of these genes in different growth phases or in oxidative stress condition, which are designed to simulate the host environment. The results shall reveal which of the putative genes are authentic small RNA-coding genes and provide the first experimental dataset regarding the small RNA-mediated regulatory functions in MTB. These findings shall help us understand the adaptive responses of MTB and shall lead to a better understanding of the pathogenic mechanisms of this organism. Knowledge of the small RNA-mediated regulatory functions in MTB shall enable us to better understand the adaptive responses of MTB in the host environments and may suggest new targets for the development of more effective therapeutic strategies for the intervention of the infection/disease process caused by this notorious pathogen.

Ref. No. RFCID: 09080412

Ab57
Molecular determinants that enable swine-like H1N1 influenza virus infection and transmission in humans

HL Yen[1,2], PPH Cheung[1,2], DDY Wong[1,2], OTW Li[1], ESK Ma[1],
LLM Poon[1], GJ Smith[1], JM Nicholls[3], Y Guan[1], RG Webster[4],
R Webby[4], JSM Peiris[1,2]
[1]Department of Microbiology, HKU
[2]HKU-Pasteur Research Centre Limited, HKU
[3]Department of Pathology, HKU
[4]St. Jude Children's Research Hospital, Memphis, TN, USA

Background: Zoonotic infections with swine influenza viruses have occurred sporadically in the past. However, sustained human-to-human transmission of a swine virus did not occur until the emergence of the 2009 pandemic H1N1 (H1N1pdm) virus. H1N1pdm possesses a unique gene combination with gene segments derived from the North America triple reassortant and the Eurasian avian-like swine influenza viruses. To identify molecular determinants that enable sustained human-to-human transmission, we compared the direct contact and aerosol transmission efficiency of the pandemic viruses with related swine influenza viruses in ferrets.

Methods: Ferrets were inoculated with 10^5 TCID$_{50}$ of the virus. Naïve direct contact and aerosol contact ferrets were introduced at 1day post-inoculation (dpi). Transmission was defined by detection of virus from nasal washes and/ or seroconversion. Seasonal H3N2 [A/Wuhan/359/95 (Wuhan95)] and H1N1pdm influenza viruses [A/California/4/09 (CA04) and A/HK/415742/09 (HK415742)] were studied. Swine influenza viruses with different gene combinations were selected from our surveillance programme in southern China: classical swine influenza virus-like A/sw/HK/4167/99 (H1N1) (swHK4167), triple reassortant virus-like A/sw/Arkansas/2976/02 (H1N2) (swAR2976) and A/sw/HK/915/04 (H1N2) (swHK915), and A/sw/HK/201/10 (H1N1) (swHK201) containing genes derived from Eurasian, triple reassortant and H1N1pdm influenza viruses.

Results: Direct contact transmission from inoculated donor ferrets to their cage-mates was observed for all viruses studied, albeit at different efficiency. Aerosol transmission was detected with human seasonal influenza virus Wuhan95 (2/3), H1N1pdm influenza virus CA04 (3/3) and swine precursor virus swHK915 (1/3). Transmission of Wuhan95 or CA04 to aerosol contacts was detected at 4 or 6 dpi, while transmission of swHK915 was detected later at 8 dpi. 1/3 aerosol contact ferret in the swHK915 group seroconverted. No aerosol transmission (0/3) was detected with HK415742, swHK4167, swAR2976, or swHK201. Pandemic H1N1 and swine influenza viruses replicated in the upper and lower respiratory tract, while human seasonal influenza Wuhan95 was restricted in the upper respiratory tract.

Conclusions: Differences between H1N1pdm viruses CA04 and HK415742 suggests that efficient aerosol transmission may be determined by a limited number of molecular determinants. While the swine influenza viruses studied were able to transmit via the direct contact route, only swHK915 which shares a common genetic derivation for 7 genes with H1N1pdm possessed capacity for aerosol transmission, albeit of moderate efficiency. The long-term influenza surveillance system established in Hong Kong has provided divergence of swine influenza isolates for the study. Identification of molecular determinants that enable H1N1pdm transmission would allow us to evaluate the human-to-human transmission potential of other newly emerged influenza viruses.

Ref. No. RFCID: HSI-Lab-16

Ab60
Modelling the spread and real-time surveillance of antiviral resistance during the next influenza pandemic: local and global considerations

JT Wu, T Mangal
School of Public Health, HKU

Influenza pandemic preparedness is a national priority for many countries, and governments in many developed countries are stockpiling oseltamivir (Tamiflu) as part of their pandemic planning. The importance of antiviral resistance surveillance during influenza outbreaks is well-documented, however no studies to date have explored the optimal sampling strategy to efficiently monitor resistance during a pandemic when large amount of oseltamivir will be used. For example, with a given sampling capacity, what is the most efficient

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testing strategy for a range of resistance emergence probabilities (P_A)? How many samples and which sampling strategies will provide robust estimates of the *de novo* rate of emergence and relative transmissibility of the resistant strain?

Using estimated parameters from published literature, we developed a multi-strain discrete-time stochastic transmission model to simulate an influenza pandemic in a fully susceptible closed population. The timing of the emergence of antiviral resistance has a strong effect on both the resistant attack rate (RAR) and the wild-type attack rate (AR), with early emergence resulting in a substantially higher RAR and lower wild-type AR, although the total AR remains relatively unaffected. We considered two sampling strategies: (i) cross-sectional sampling in which outpatients were sampled when they attended a health facility for antiviral treatment; and (ii) cohort sampling in which outpatients receiving antiviral treatment were followed and sampled for five days. We assumed a treatment probability of 0.3 and a fitness cost of 10% for the resistant strain. As resistance emerges under drug pressure, the cohort sampling strategy effectively detects resistance with an average time-lag of 2 days when enrolment > 25 samples day^{-1} and emergence probabilities $P_A < 0.01$. The cohort sampling strategy can be therefore used to estimate of the rate of *de novo* resistance emergence. Cross-sectional sampling detects resistance 15-28 days after first emergence for $P_A = 0.01$ and 24-61 days for $P_A = 0.001$ (sampling 5-75 outpatients day^{-1}) and can provide information on the relative transmissibility of the resistant strain. Increasing cross-sectional sampling capacity beyond 50 samples day^{-1} (for $P_A = 0.01$) or 100 samples day^{-1} (for $P_A = 0.001$) does not reduce the time-lag between first emergence of resistance and detection.

The results indicate that increasing daily sampling capacity decreases the time-lag between the first emergence of resistance and detection up to a critical threshold, beyond which increasing capacity is unlikely to confer any advantage. The next step in devising a practical resistance surveillance programme will be to determine the optimal combined strategy to obtain reliable estimates for *de novo* emergence and transmissibility of the resistant strain.

Ref. No. RFCID: 09080792

Ab65
Pathogenesis of human swine influenza virus and *Streptococcus pneumoniae* infection co-infection

MT Ling[1], W Tu[1], PL Ho[2], YL Lau[1]
[1]Department of Paediatrics & Adolescent Medicine, HKU
[2]Department of Microbiology, HKU

Since its first identification in North America in April 2009, the novel pandemic H1N1 2009 (pdmH1N1) virus has been spreading in humans worldwide, giving rise to the first pandemic in the 21st century. So far, pdmH1N1 infection has already caused over 18,172 deaths worldwide. Recent studies on this pandemic revealed that most of the deaths were resulted from secondary bacterial pneumonia infection caused by common bacteria found in upper respiratory tract, such as *Streptococcus pneumoniae*, rather than due to influenza infection alone. Other independent studies also demonstrated that co-infection of influenza virus and bacteria may play a critical role in lung damage and pneumonia during influenza infection. Previous studies have shown that mannose binding lectin (MBL) exhibits anti-viral and anti-bacterial effects in vitro and in vivo. However, the immunomodulatory role of MBL during pdmH1N1/ *S. pneumoniae* co-infection has not been reported before. In this study, we aim to compare the severity of pdmH1N1/*S. pneumoniae* co-infection with pdmH1N1 infection alone, and to elucidate the functional implication of MBL during co-infection. Our in vitro preliminary data showed that recombinant MBL could successfully bind to immobilised pdmH1N1 in a dose-dependent manner. However, recombinant MBL was found to be incapable of binding immobilized *S. pneumoniae*. These data suggest that MBL may play a vital role in modulating pdmH1N1 and the subsequent bacterial infection and attenuate the severity of the co-infection. The in vivo function of MBL during co-infection will be further investigated by using MBL knockout mouse model. This study may provide new insight into developing novel therapeutic strategies, such as using pneumococcal vaccine or human recombinant MBL, to modulate severity of pdmH1N1/*S. pneumoniae* co-infection.

Ref. No. RFCID: HSI-Lab-11

Ab94
Evaluation of molecular tests for the rapid detection of rifampicin and isoniazid resistance in Mycobacterium tuberculosis and their impact on patient management

PL Ho[1], WC Yam[1], CC Leung[2], WW Yew[3], YW Thomas Mok[4], KS Chan[5], CM Tam[2]
[1]Department of Microbiology
[2]TB, HKU and Chest Service, DH
[3]TB and Chest Unit, GH
[4]Respiratory Medical Department
[5]HHH, KH

Background: This study evaluated genotypic tests for detection of rifampicin (RIF) and isoniazid (INH) resistance in MTB in respiratory specimens. The potential impact of implementing molecular tests for detection of RIF and INH resistance in MTB on patient management was also assessed.

Methods: This study was conducted prospectively in 15 participating centres at the TB and Chest unit of the Department of Health (DH), and the TB and Chest units at the Grantham Hospital (GH), the Kowloon Hospital (KH), and the Haven of Hope Hospital (HHH). Adult patients suspected to have active tuberculosis (TB) and who were considered to be at risk of infection by INH and/or RIF resistant strains were enrolled. Clinical specimens (sputum or other appropriate samples) were tested by PCR assays specific for IS6110, rpoB and katG. The amplicons were sequenced for detection of resistance mutations. PCR were conducted on a weekly basis. Specimens with resistant strains were also tested by the MTBDRplus and the INNO-LiPA Rif.TB line probe assays. AFB smear and mycobacterial culture were performed by conventional methods. A total of 720 patients were enrolled and 596 (82.7%) patients had culture-confirmed TB. Culture and susceptibility testing result was used as the reference.

Results: The overall diagnostic sensitivities of the IS6110, rpoB and katG PCR assays were 98.9%, 95.9% and 88.7%, respectively. A valid molecular test result was obtained in 94.3% (562/596) and 88.3% (526/596) of the patients for the rpoB and katG loci, respectively. Susceptibility testing showed that 50 patients had infection by strains with resistance to INH and/or RIF, including MDR-TB (INH-R/RIF-R, n=13), INH-R/RIF-S (n=34), and INH-S/RIF-R (n=3). The PCR-sequencing assays allowed rapid diagnosis of drug resistance in 32 patients (12 MDR-TB, 17 INH-R/RIF-S and 3 INH-S/RIF-R) with turnaround time (mean±SD) of 10.2±5 days for rpoB and 9.5±4.8 days for katG. The same number of patients with infections by resistant strains involving mutations in katG and rpoB were detected by testing with the MTBDRplus line probe assay. The INNO-LiPA Rif.TB was less sensitive and was able to detect mutations in six specimens only. An additional 12 patients with INH-resistant strains associated with mutations in the promoter region of inhA were detected by the MTBDRplus assay. Case review showed that the rapid tests had benefited patient management through earlier admission, more timely use of category IV regimens and discontinuation of inactive drugs.

Conclusions: This study demonstrated that the introduction of a rapid diagnosis strategy contributed to earlier diagnosis of drug-resistant TB and more appropriate use of anti-TB drugs for these patients.

Implications: Chest units in Hong Kong should consider introduction of molecular assays for rapid diagnosis of drug resistance in routine care. The choice of test assays and frequency of testing will depend on the patient load, availability of technical expertise and laboratory space and equipments.

Ref. No. RFCID: 04050032

Ab96
Investigation of antibody-dependent enhancement of SARS-coronavirus infection and its role in pathogenesis of SARS

MS Yip[1], CY Cheung[2], PH Li[1], R Bruzzone[1], JSM Peiris[1,2], M Jaume[1]
[1]HKU-Pasteur Research Centre Limited
[2]Department of Microbiology, HKU

Antibody-dependent enhancement (ADE) is a mechanism by which viruses, such as dengue, HIV and Ebola, gain entry into some target cells through the use of host antiviral humoral immune responses. Here, we studied the ability of severe acute respiratory syndrome coronavirus (SARS-CoV) to use ADE mechanisms to enhance its

infectivity towards cells of the haematopoietic lineage. We found that heat-inactivated immune serum from rodents vaccinated with recombinant native full-length Spike protein trimers triggered infection of human immune cells (monocytic and B cell lines) by SARS-CoV Spike pseudotyped particle (SARS-CoVpp). The occurrence of antibody-mediated infection of human Raji B cells was further investigated by using live SARS-CoV. Similarly to results obtained with the SARS-CoVpp, only anti-SARS-CoV Spike serum, but not mock immune-serum, induced a massive increase of SARS-CoV viral genes (ORF1b and Nucleocapsid) and viral proteins (Membrane and Nucleocapsid) in Raji B cells. As revealed by immunostaining, only a relatively low – however significant - percentage of the Raji cells became infected by antibody-mediated infection and did not allow direct assessment of productive replication by conventional cytopathic assays and TCID50 titration. Taken together, our data suggested that SARS-CoV is able to enter human immune cells via an antibody-mediated pathway and consequences of such infection are under investigation (productive replication, cytokines secretion profile and cell death etc). Our data raise reasonable concerns regarding the use of SARS-CoV vaccine in humans and pave the way to further studies focusing on the role of immune-mediated infection phenomenon during SARS pathogenesis.

Ref. No. RFCID: 09080872

Ab103
In silico structure-based screening of inhibitors for influenza A virus proteins

JST Choi[1], YH Yang[1], JCK Ngo[1], DCC Wan[2], LLM Poon[3], PC Shaw[1]
[1]Molecular Biotechnology Programme, Department of Biochemistry and Centre for Protein Science and Crystallography, CUHK
[2]School of Biomedical Sciences, CUHK
[3]State Key Laboratory for Emerging Infectious Disease & Department of Microbiology, HKU

With the continuous ressortment of influenza viruses, including the occurrence of the new H1N1 influenza virus that leads to the worldwide pandemic in recent years and the increased resistance to the existing available anti-influenza drugs, it is essential to keep up the momentum in searching for inhibitory agents. Among the influenza proteins, Nucleoprotein (NP) is highly conserved molecule. It is a protein that binds to the RNA genome of influenza virus. Homo-oligomerisation of NP and interaction of NP to RNA are essential for the replication and transcription of the virus. Another highly conserved influenza A protein is the RNA polymerase complex, which is composed of three subunits, PA, PB1, and PB2. The crystal structure of H5N1 NP and the PA-PB1 and PB1-PB2 subunits of the RNA polymerase have recently been solved. With the aim of finding new compounds for treating influenza virus infection, our group is in the process of using in silico structure-based screening to search for small molecule compounds that bind to specific sites on the conserved influenza proteins nucleoprotein and RNA polymerase subunits. Compounds from ZINC (UCSF) and NCI diversity setII are docked against these proteins by Autodock4.0 and Autodock Vina. Selected compounds will then be assayed toward their interaction with the proteins by surface plasmon resonance and for inhibiting the oligomerisation of nucleoprotein and the transcription and the replication activities of the polymerase complex. Compounds that ranked high in the in vitro assays will be further tested for their cytotoxicity and inhibitory effect on the propagation of the various influenza virus strains.

Ref. No. RFCID: 10090022

Ab114
Development and application of a real-time PCR protocol for rapid and simultaneous detection of Mycobacterium tuberculosis, drug resistance and Beijing genotype in a diagnostic laboratory setting

ETY Leung[1], Z Lin[1], N Lee[2], R Wong[2], EWC Chan[1], RCC Chan[1], M Ip[1]
[1]Department of Microbiology, CUHK
[2]Department of Medicine and Therapeutics, PWH, CUHK

Background: Fighting tuberculosis (TB) is a challenge and a major public health concern worldwide. The emergence of multidrug-resistant (MDR)-TB and more recently, extensive drug-resistant (XDR)-TB (2) has created a global threat to TB control and elimination. There is compelling evidence that *Mycobacterium tuberculosis* (MTB) with Beijing-family genotype could disseminate more efficiently, acquire drug resistance more frequently, and could evade the protective effect of BCG vaccine.

Objectives: To develop and apply a real-time PCR protocol for the laboratory diagnosis of *Mycobacterium tuberculosis*, with simultaneous detection of genotypes, in diagnostic laboratory settings.

Methods: A successful protocol relies on optimised mycobacterial cell wall lysis method, DNA extraction and purification method, and multi-probe multiplex quantitative PCR design. Three different sizes/materials of beads (200μm glass beads, 900μm glass beads and 0.1mm zirconia beads) for mycobacterial cell lysis and four different DNA purification methods (Chelex-100 resin, QIAgen DNA mini kit, QIAgen viral DNA/RNA kit, and Invitrogen MyOne SILANE magnetic particles with in-house formulated buffers) were compared for their sensitivities in capturing minute quantities of MTB DNA from clinical specimens. New primers and Taqman probes were designed for simultaneous amplification of MTB *IS6110* gene, MTB Beijing/W RD identification gene, and human β-globin gene (internal positive control). Specificities of primers and probes are tested. Quantitative PCR conditions and component concentrations are optimized.

Results: A protocol based on real-time PCR using multiple primer pairs and TaqMan probes were designed and optimised using a collection of well characterised drug resistant MTB. The protocol has been applied in a diagnostic laboratory setting in parallel and in comparison with the existing conventional methods for evaluation.

Conclusions: The developed protocol will provide a rapid, sensitive and reliable reference to physicians while waiting for the traditional culture results. The method is more affordable in comparison with any TB diagnosis kits currently in the market.

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Ab117
Study of AAV- and peptide-based vaccine candidates against avian influenza virus H5N1 infection in animal model

BJ Zheng[1], J Zhou[1], M Chen[1], HY Zhang[1], CCS Chan[1], VKM Poon[1], HCV Leung[1], TT Chao[1], LW Lu[2], DY Jin[3], KY Yuen[1]
[1]Department of Microbiology, HKU
[2]Department of Pathology, HKU
[3]Department of Biochemistry, HKU

Recent outbreaks of H5N1 avian influenza virus that causes severe diseases in humans have raised concerns over an imminent influenza pandemic. As yet, there is no effective and specific vaccines that could

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be used to prevent and combat H5N1 infection. In this study, we evaluated immune responses and protective effects of a vaccination strategy priming with DNA and/or rAAV expressing viral antigens HA, NA, NP and PA, and then boosting with pooled peptides restricted to both MHC class I and II. Our results showed that the boost of pooled peptides could significantly enhance specific antibody, Th and CTL responses in mice. However, only the boost of pooled peptides targeting HA could induce neutralising antibody response. The boost of pooled peptide induced relative higher Th2 but lower Th1 responses than that of rAAV. The pooled peptides targeting HA induced higher level of IFN-γ-producing CTL responses, while those targeting NP and NA evoked higher level of IL-2-secreting CTL responses. We further demonstrated that DNA-HA vaccination boosted with rAAV-HA and pooled peptides targeting HA could completely protect the animals from lethal H5N1 viral infection. DNA-HA or rAAV-HA vaccination boosted with pooled peptides targeting HA could privide 70-80% protection and the vaccinations of NP and NA DNA/rAAV vaccines and boosted with pooled peptdies, which induced specific CTL but no neutralising antibody, could also provide 10-30% protection against the lethal viral infection. Taken together, this study has demonstrated the strategy that the vaccination priming with DNA and/or rAAV vaccines and boosting with pooled peptides can indeed induce both antibody and T cell responses and provide different levels of protection against H5N1 virus infection, which provides the theoretical and practical basis for development of effective means and strategies for prevention of recurrent H5N1 avian influenza, especially those caused by mutated virus with neutralising antigenic drift/shift in the haemagglutinin.

Ab118
A pilot study for development of anti-influenza A compounds

BJ Zheng[1], CCS Chan[1], VKM Poon[1], F Ng[1], CM Ho[2], CM Che[2], KY Yuen[1]
[1]Department of Microbiology, HKU
[2]Department of Chemistry, HKU

Recent outbreaks of the H5N1 avian influenza virus have raised concerns over an imminent influenza pandemic worldwide. Yet, there is no effective or specific anti-H5N1 avian flu agent that could be used to combat this fatal infection. Our previous study had demonstrated that a chemical compound BFDBSC can inhibit infection of H5N1 virus in cell culture and that its anti-H5N1 activity might be attributed to the halogenated benzoyl residues. This compound holds great promise for clinical application. This pilot study was designed to assess anti-H5N1 activity and toxicity of 4 chemical compounds with halogenated benzoyl residues in cell culture system. Our results showed that: (1) two compounds, FP-BFDBSC and BFB-gallate showed higher antiviral effects than BFDBSC, whearas the other two BFB-borneol and BFB-menthol showed lower antiviral effect than BFDBSC; and (2) these compounds did not show toxicity in cell cultures. Our results have demonstrated that the halogenated benzoyl residues may play a key role in anti-H5N1 effects of these compounds. However, all these compounds showed poor resolvability, which has limited their application.

Ab119
An M2e-based polypeptide vaccine protects mice from lethal challenge with divergent H5N1 influenza viruses

GY Zhao[1], YP Lin[1], J Guan[2], L Du[3], H Sui[1], CCS Chan[1], Z Kou[2], Y Guo[2], S Jiang[3], Y Zhou[1], BJ Zheng[1]
[1]Department of Microbiology, HKU
[2]State Key Laboratory of Pathogen and Biosecurity, Beijing Institute of Microbiology and Epidemiology, Beijing, PRChina
[3]Lindsley F. Kimball Research Institute, New York Blood Center, New York, USA

A growing concern has arisen regarding the pandemic potential of the highly pathogenic avian influenza (HPAI) H5N1 viruses. Consequently, there is an urgent need to develop an effective and safe vaccine against the divergent H5N1 influenza viruses. Here, we designed a tetra-branched multiple antigen peptide (MAP)-based vaccine, designated M2e-MAP, which contains the sequence overlapping the highly conserved extracellular domain of matrix protein 2 (M2e) of a HPAI H5N1 virus, and investigated its immune responses and cross-

protection against different clades of H5N1 viruses. We found that M2e-MAP induced potent M2e-specific IgG antibody responses in the vaccinated mice and protected mice from lethal challenge of divergent strains of H5N1 viruses. These results suggest that M2e-MAP has the potential to be developed into an effective subunit vaccine for the prevention of infection by a broad spectrum of HPAI H5N1 influenza viruses

Ab120
Co-administrations of antiviral and anti-inflammatory against avian influenza virus H5N1 infection in animal model

BJ Zheng[1], KW Chan[2], YP Lin[1], GY Zhao[1], CCS Chan[1], HJ Zhang[1], HL Chen[1], SSY Wong[1], SKP Lau[1], PCY Woo[1], KH Chan[1], DY Jin[3], KY Yuen[1]
[1]Department of Microbiology, HKU, [2]Department of Pathology, HKU
[3]Department of Biochemistry, HKU

The mortality FROM human infection by influenza A/H5N1 virus can exceed 80%. The high mortality and its poor response to the neuraminidase inhibitor, oseltamivir, has been attributed to uncontrolled virus-induced cytokine storm. We challenged BALB/c mice with 1000 LD_{50} of influenza A/Vietnam/1194/04. Survival, body weight, histopathology, inflammatory markers, viral loads, T lymphocyte counts, and responses to neutralising antibody were documented in infected mice treated individually or in combinations with zanamvir, celecoxib, gemfibrozil, and mesalazine. In order to imitate the real life scenario, treatment was initiated at 48 hours following viral challenge. There were significant improvements in survival rate ($P=0.02$), survival time ($P<0.02$) and inflammatory markers ($P<0.01$) in the group treated with a triple combination of zanamivir, celecoxib and mesalazine when compared with zanamivir alone. Zanamivir with or without immunomodulators reduced viral load to a similar extent. Insignificant prolongation of survival was observed when individual agents were used alone. Significantly higher levels of CD4^{+} and CD8^{+} T lymphocytes as well as less pulmonary inflammation were also found in the group receiving triple therapy. Zanamivir alone reduced viral load but not inflammation and mortality. The survival benefits of adding celecoxib and mesalazine to zanamivir could be due to their synergistic effects in reducing cytokine dysfunction and preventing apoptosis. Combinations of a neuraminidase inhibitor with these immunomodulators should be considered in randomised controlled treatment trials of patients suffering from H5N1 infection.

Ab121
D225G mutation in haemagglutinin of pandemic influenza H1N1 (2009) virus enhances virulence in mice

BJ Zheng[1], KH Chan[1], AJX Zhang[1], J Zhou[1], CCS Chan[1], VKM Poon[1], K Zhang[1], VHV Leung[1], DY Jin[2], PCY Woo[1], JFW Chan[1], KKW To[1], H Chen[1], KY Yuen[1]
[1]Department of Microbiology, HKU
[2]Department of Biochemistry, HKU

Though the majority of infections by the pandemic influenza H1N1 (2009) virus is mild, a higher mortality occurs in young adults with no risk factors for complications. Some of these severe cases were infected by virus with an aspartate to glycine substitution at 225 position (D225G, H3 numbering) in the haemagglutinin (HA). Previous studies with the highly virulent 1918 pandemic H1N1 virus suggested that such substitution was associated with a dual binding specificity of virus for both α2,3 and α2,6 linked sialic acid receptors on host cells. Thus the D225G mutant may cause more severe disease with its increased predilection for the lower respiratory tract, where the α2,3 sialic acid receptor is more prevalent, but this hypothesis has not been investigated. We obtained a mutant virus after four sequential passages in lungs of BALB/c mice with a wild type pandemic influenza A H1N1 (2009) virus. One plaque purified mutant virus had a single non-synonymous D225G mutation in the HA gene. This mutant was more toxic to chick embryo and produced a viral load of about two log higher than that of the wild type parental virus during the first 24 hours. Pathogenicity test showed that the mean 50% lethal dose in mice (MLD50) was reduced from over 2×10^6 plaque forming units (PFU) with the parental virus to just 150 PFU with the mutant virus. The survival of mice challenged with the mutant virus was significantly decreased when compared with the parental virus ($P<0.0001$). Significantly higher viral titres and

elevated pro-inflammatory cytokines in lung homogenates of mice infected with the mutant virus were found, which were compatible with severe histopathological changes of pneumonitis. The only consistent mutation in the genomes of viral clones obtained from dying mice was D225G substitution.

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Ab122
Investigating the involvement of PI3K/PDK-1/Akt pathways and Notch signals in SARS-CoV membrane-induced apoptosis

EHY Luk, EHY Chan
Department of Biochemistry, CUHK

The severe acute respiratory syndrome-coronavirus (SARS-CoV) caused an outbreak of atypical pneumonia in 2003. The SARS-CoV genome encodes for several proteins including the membrane (M) protein. In *Drosophila*, we previously identified *phosphoinositide-dependent kinase-1 (PDK-1)* as a dominant suppressor of M-induced apoptotic cell death, and further showed that phosphorylation of Akt protein, a target of PDK-1, was attenuated by M overexpression. As phosphoinositide-3 kinase (PI3K), PDK-1 and Akt are all involved in regulating cell survival and death, in this study we investigated the involvement of the PI3K/PDK/Akt pathway in M-induced apoptosis. Apart from the PI3K/PDK/Akt pathway, we also found that Groucho (Gro), the *Drosophila* homologue of transducin-like Enhancer of split (TLE), as a suppressor of M-induced apoptosis. The TLE protein family represses transcription through its association with Hairy/Enhancer of Split (HES1). Recently the Notch signal has been reported to de-repress Akt signal via HES1, therefore we also studied how Gro and Notch signaling are involved in M-induced apoptosis. This work will shed light on the pro-apoptotic mechanisms of the SARS-CoV M protein and provide a better understanding of SARS-CoV pathogenesis.

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Ab126
Complete genome analysis of drug-susceptible and multidrug-resistant *Mycobacterium tuberculosis* Beijing family strains

KK Leung[1], TF Chan[2], KT Kwong[1], NY Fong[3], KY Yim[1], SK Lou[1], CW Yip[4], RCY Chan[5], KM Kam[4], SKW Tsui[1,3]
[1]Hong Kong Bioinformatics Centre, CUHK
[2]Department of Biochemistry, CUHK
[3]Centre for Microbial Genomics and Proteomics, CUHK
[4]Tuberculosis Reference Laboratory, Public Health Laboratory Centre, DH
[5]Department of Microbiology, CUHK

Tuberculosis (TB) remains one of the major causes of illness and death globally. Although the number of new TB cases per capita has been falling since 2003, the emergence of multidrug resistant (MDR) and extensively drug resistant (XDR) cases of TB poses new threat to the successful worldwide control of the disease. The Beijing/W lineage of *Mycobacterium tuberculosis* has received much attention over the past decade due to its prevalence throughout Asia, parts of the former Soviet Union, and several other geographical locations including the United States. The strain also demonstrated hypervirulence in animal models and an increased likelihood to develop multidrug resistance. The current definition of XDR in TB is defined as resistance to at least isoniazid and rifampicin, any fluoroquinolone, and with at least one of the three second-line drugs. Here we show that our knowledge of the biology of this pathogen is still limited. We performed genome sequencing and reported the initial investigation of four Beijing/W isolates from Hong Kong SAR, of which two were shown to have drug resistance that is far beyond the current XDR standard – a "Totally Drug Resistant" (TDR) phenotype. Comparative genomics of the four Beijing/W isolates provided us with two sets of polymorphisms: one found among all the Beijing/W strains and one within the TDR strains. Gene-ontological analysis showed that much of the rest of the polymorphisms lie in those of unknown functions. For the set of known genes that harbor TDR-specific changes, they are involved in diverse biochemical processes. Together, our results serve as an entry point of a systematic genome-wide investigation of drug resistance in TB at a nucleotide resolution.

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Ab128
The infection attack rate and severity of 2009 pandemic influenza (H1N1) in Hong Kong

JT Wu[1], ESK Ma[2], CK Lee[3], DKW Chu[2], PL Ho[2], AL Shen[1], A Ho[1], IFN Hung[4], S Riley[1], LM Ho[1], CK Lin[3], SV Lo[6,7], YL Lau[8], GM Leung[1], BJ Cowling[1], JSM Peiris[2,9]
[1]School of Public Health, HKU
[2]Department of Microbiology, HKU
[3]Hong Kong Red Cross Blood Transfusion Service, HA
[4]Department of Medicine, HKU
[5]HA
[6]FHB
[7]Department of Paediatrics and Adolescent Medicine, HKU
[8]HKU-Pasteur Research Centre Limited, HKU

Background: Serial cross-sectional data on antibody levels to 2009 pandemic influenza A (H1N1) virus from a population can be used to estimate the infection attack rates and immunity against future infection in the community.

Methods: Between April and December 2009, we obtained 12,217 serum specimens from blood donors (16-59 yo), 2,520 from hospital outpatients (5-59 yo), and 917 from subjects of a community paediatric cohort study (5-14 yo). We estimated infection attack rates by comparing the proportions of specimens with antibody titres $\geq 1:40$ by viral microneutralisation before and after the first wave of the pandemic. Estimates were validated using paired sera from 324 individuals that spanned the first wave. Combining these estimates with epidemiologic surveillance data, we calculated the proportion of infections that led to hospitalisation, intensive care admission, and death.

Results: We found that 3.7% and 14.2% of 5-59 yo had antibody titres $\geq 1:40$ before and after the first wave. The overall attack rate was 10.5% with the following age-stratification: 43.4% in 5-14 yo, 15.8% in 15-19 yo, 11.8% in 20-29 yo, and 4.-4.6% in 30-59 yo. Case-hospitalisation rates were 0.47%-0.87% among 5-59 yo. Case-ICU and case-fatality rates increased from 7.9 and 0.4 per 100,000 infections in 5-14 yo to 75 and 26.5 per 100,000 infections in 50-59 yo.

Conclusions: Almost half of all school-children in Hong Kong were infected during the first wave. Compared to school-children aged 5-14, older adults aged 50-59 had 9.5 and 66 times higher risk of ICU admission and death if infected.

Ref. No. RFCID: PHE-20

Ab133
Complex network models of disease propagation: modelling, predicting and assessing the transmission of SARS

M Small
Department of Electronic and Information Engineering, PolyU

Standard models of disease transmission assume that all individuals in a community are equally well connected and therefore that they are all equally effective in transmitting a disease. For many diseases, this assumption is reasonable - certainly, if a large number of individuals are infected and the community in general is well mixed then this is a reasonable approximation. However, for diseases that infect a relatively small portion of the population and do so in discrete clusters, this approximation is not able to usefully model reality. On the other hand, complex network models directly model the connections between individuals within the community. There is a growing body of experimental evidence that suggests that human connections follow a small-world model (that is, most of you friends are friends themselves, however a small number of random friendships is sufficient to make chains of friendships between random individuals short) or even have a scale-free distribution (that is, a small number of individuals will have an arbitrary large number of contacts).

In this project, we examine evidence from the available time series data of the SARS outbreak in Hong Kong in 2003 and the ongoing global transmission of avian influenza in birds to show that small-world and scale-free models are consistent with the observed data (respectively). We then apply an extended mathematical analysis to determine the behaviour of diseases on such networks. We find that while disease transmission on an infinite scale free network will always exhibit a zero threshold (that is, the disease will always become endemic), for finite networks, or nodes with bounded infectivity the threshold is non-zero.

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Moreover, for computational models which mimic the more structured behaviour of individuals in a community such as Hong Kong we show that the predicted threshold is higher still (the disease is easier to control – compared to the results cited within the theoretical physics community). Moreover, if we consider a disease for which individuals may choose to vaccinate, we find that transmission on a scale free network is easier to control that the traditional homogeneous model – the reason is that hubs nodes (those individuals with many connections) will become more likely to vaccinate, and their vaccination will reduce the overall transmissibility significantly.

Our work provides an alternative model for disease transmission. This model is especially useful for diseases in the early stage of transmission - when the overall level of infection is low, and when infection occurs in discrete clusters. This work suggests that for a disease such as SARS, the existence of super-spreaders can be explained by the variability of connection between individuals rather than specific variation in physiological response (that is, the power law distribution provides sufficient variability). Therefore, control of the disease can best be achieved by focusing on these highly connected "hub" nodes - whom can be relatively easily identified.

Ab135
Double-stranded RNA-binding protein PACT functions as a cellular activator of RIG-I-dependent innate antiviral response and is targeted by viral interferon-antagonising proteins

KH Kok[1], JMH Ng[1], KL Siu[1], SWN Au[2], KY Yuen[3], BJ Zheng[3], DY Jin[1]
[1]Department of Biochemistry, HKU
[2]Department of Biochemistry, CUHK
[3]Department of Microbiology, HKU

Type I interferons (IFNs) are important components of innate antiviral immunity. Exactly how the cell senses viral infection and activates type I IFN production has just begun to be understood after the identification of a prototypic virus sensor named RIG-I in 2004. RIG-I recognises viral RNA ligands and generates an activation signal to the protein kinases that phosphorylate the transcription factors to activate type I IFN promoters. Exactly how RIG-I senses viral nucleic acids remains to be fully elucidated. In this study, we characterised double-stranded RNA (dsRNA)-binding protein PACT to be a novel cellular activator of RIG-I. PACT physically interacts with the C-terminal regulatory domain of RIG-I and potently stimulates RIG-I-induced type-I IFN production in cultured cells. PACT also cooperates with RIG-I to sustain the activation of antiviral defence. Depletion of PACT by RNAi substantially dampened Sendai virus- and vesicular stomatitis virus-induced activation of IFN production. The activation of RIG-I by PACT does not require double-stranded RNA-dependent protein kinase or Dicer, but is mediated by a direct interaction that leads to stimulation of ATPase activity. Interestingly, the RIG-I-activating activity of PACT is counteracted by influenza A virus NS1 and herpes simplex type I Us11 proteins, which are known to be virus-encoded IFN antagonists. Taken together, our work reveals a novel component and a new layer of regulation in RIG-I-dependent antiviral response. Our findings have implications in the study of virus-host interaction as well as in the rationale design and development of novel antiviral and immunomodulatory agents.

Ab136
Severe acute respiratory syndrome coronavirus M protein is an inhibitor of type I interferon production that prevents the formation of a functional IRF kinase complex

KL Siu[1], KH Kok[1], MHJ Ng[1], VKM Poon[2], KY Yuen[2], BJ Zheng[2], DY Jin[1]
[1]Department of Biochemistry, HKU
[2]Department of Microbiology, HKU

Severe acute respiratory syndrome (SARS) coronavirus is a highly lethal human pathogen that counteracts innate antiviral response through multiple mechanisms. It encodes several structural and non-structural proteins capable of inhibiting the production and action of type I interferons, which are centrally important effectors in innate antiviral immunity. In this study, we show that SARS-coronavirus M protein inhibits transcriptional activity of type I interferon promoters. M protein dampens the activation of interferon-stimulated response element-dependent transcription by double-stranded RNA,

RIG-I, MDA5, TBK1, IKKε and VISA, but has no influence on the transcriptional activity of the same promoter induced by transcription factors IRF3 or IRF7. Distinct to influenza A virus NS1 protein, the action of SARS-coronavirus M protein occurs after the activation of RIG-I but before the phosphorylation of IRF3/7. M protein physically interacts with RIG-I, TBK1, IKKε and TRAF3, and retains some of them in membrane-associated cytoplasmic compartments such as the Golgi apparatus. As a result, the expression of M protein prevents the formation of a functional TRAF3·TANK·TBK1/IKKε complex, thereby inhibiting TBK1/IKKε-dependent phosphorylation and activation of IRF3/IRF7 transcription factors. Taken together, our work reveals a new mechanism by which SARS-coronavirus antagonises the production of type I interferons. Our findings have implications in the study of SARS pathogenesis as well as in the rational design and development of vaccines and antivirals for prevention and control of coronavirus infection.

Ab138
Usefulness in using portable overnight pulse oximeter for screening obstructive sleep apnoea in adult patients in primary health care setting

LK Chiang[1], PTK Ng[1], CW Kam[1], L Ng[1], CY Wong[2], KS Yee[3], HN Tse[3], A Lee[4]
[1]General Outpatient Department, KWH
[2]Chest & TB Unit, WTSH
[3]Department of Medical & Geriatrics, KWH
[4]Departments of Community and Family Medicine, CUHK

Background: In view of its high prevalence, i.e. 4% for adult male and 2% for female and serious associated morbidities, obstructive sleep apnoea (OSA) has been described as a major public health concern. Due to limitation of clinical assessment and lack of diagnostic test, primary health care physicians have to refer all those patients suspected having OSA to respiratory specialist for confirmation test. The gold standard diagnostic test for OSA is overnight polysomnography (PSG), however, which is costly, time consuming and need expertise involvement. The sleep services in both of public and private health care in Hong Kong are limited. There is need for a simpler and cheaper screening test that can be implemented in primary health care.

Methods: A prospective study involving 40 patients suspected to have OSA was done in a General Outpatient Clinic affiliated to a regional hospital of Hong Kong. After focus assessment relevant to OSA, both of overnight pulse oximetry and polysomnography (PSG) were arranged for all subjects. The correlation and agreement between overnight pulse oximetry and PSG were assessed by correlation coefficient, r-value and Bland Altman plot. The diagnostic performance of oximetry at variable designation criteria was plotted as receiver operative characteristic (ROC) curve.

Results: There are 29 male and 11 female subjects, with average age 52 years old. The body mass index (BMI) and Epworth Sleepiness Scale (ESS) ranges from 24.1 to 41.7 kg/m^2 and from 1 to 19 respectively. Overnight pulse oximetry derived oxygen desaturation index (ODI) has mean 17.01/H and standard deviation (SD) 14.78/H, while PSG-derived apnoea hypopnoea index (AHI) has mean 25.54/H and standard deviation (SD) 20.16/H. The ODI and AHI has good correlation, r 0.702 (P<0.0001). The mean and 2 SD of the difference between ODI and AHI is 8.5/H and 28.8/H. Using case designation criteria of >/= 5/H for ODI, the sensitivity and specificity are 94% and 100% respectively.

Conclusions: Portable overnight pulse oximetry provides a good correlation and satisfactory agreement with PSG. Good diagnostic (screening) performance suggests that portable overnight pulse oximeter can be an appropriate screening test for obstructive sleep apnoea in the primary health care setting.

Ab141
Expression of avian influenza virus receptors and H5N1 virus infection in human respiratory tract

J Zhang, Z Zhang, X Fang, K Huang, JM Rayner, WF Ng, SY Lau, B Mok, Y Guan, H Chen
State Key Laboratory for Emerging Infectious Diseases, Department of Microbiology, HKU

While human infections caused by avian H5N1 virus have raised concern regarding a potential pandemic, genetic studies indicate that the H5N1 viruses causing human infections are still of the avian type. Receptor specificity is known to restrict virus cross-species transmission, with SA α2,6 Gal and SA α2,3 Gal sialic acids recognised by human and avian influenza viruses, respectively. Previous studies indicated that the lower respiratory tract is more susceptible to H5N1 avian influenza virus infection. However, H5N1 virus infection of upper respiratory tract is less defined. This study examined 144 sections of tissues from different respiratory tract sites, obtained from 88 individuals, for the distribution of SA α2,6 Gal and SA α2,3 Gal along the human respiratory tract. We found SAα2,3Gal expression is more regularly observed in lower, rather than upper respiratory tract epithelial cells, being most prevalent in lung alveolus cells, with 79% of cases scoring positive. Expression of SA α2,3Gal was comparatively rare in human trachea and bronchus sections, with 20% and 42.5% of cases positive, respectively. In contrast, expression of human influenza virus receptor, SA α2,6Gal, was mainly detected in the upper respiratory tract and to a lesser degree in the alveolar epithelium. Although the majority of H5N1 human cases have been under 40 years old, we found no significant age-associated difference in the expression of SA α2,3Gal and SA α2,6Gal in the respiratory tract. Immunohistochemical examination of respiratory tract tissues obtained post-mortem from a 2003 H5N1 human case in Hong Kong demonstrated virus infection in the trachea and bronchus cells with no apparent expression of the avian type receptor, SA α2,3Gal. *Ex vivo* infections, using both human and avian H5N1 virus isolates to infect tissues surgically removed from the respiratory tract of patients suffering non-infectious diseases, found avian H5N1 virus is able to infect human trachea and bronchus epithelial cells which do not express SA α2,3 Gal receptor. It will be important to study other factors which may contribute to the currently-observed pattern of susceptibility to H5N1 infection.

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Ab142
The ecology of SARS-coronavirus related viruses in wild and domestic animals in China

X Tang, D Vijaykrishna, W Liu, CL Cheung, H Tai, LF Li, J Zhang, G Smith, H Chen, Y Guan
State Key Laboratory for Emerging Infectious Diseases, Department of Microbiology, HKU

The identification of civet cats and raccoon dogs as the intermediate hosts responsible for transmission of SARS-coronavirus (SARS-CoV) to humans directly contributed to the prevention of re-emergence of the disease during December 2003 and January 2004, highlighting the significance of understanding the distribution and transmission pathways of emerging pathogens. Our virological investigation from wild mammals at live-animal markets in southern China during and after SARS outbreak revealed that many of the animals harbouring coronaviruses (previously unrecognised animal hosts for coronaviruses) were brought to the markets, which provides an opportunity for viral interspecies transmission. Genetic analysis of the detected viruses indicated that some species are natural hosts and some were infected at the market. During the SARS outbreak, some animals at the market were co-infected by SARS-CoV and group 1 or group 2 coronaviruses. This co-infection may provide a driving force for viral evolution to infect new hosts. These findings suggested that live-animal markets in southern China were a special micro-ecosystem that favour zoonotic disease emergence. Analysis on samples obtained from farmed civets cats and captured wild animals year-round found no sign of SARS-coronavirus. The natural reservoir of SARS-coronavirus remains unknown. While has SARS not re-emerged since 2004, it is necessary to continue searching for the natural reservoir for the SARS-coronavirus. Understanding the transmission pathway of SARS-CoV will greatly facilitate prevention of re-emergence of SARS in humans.

Ref. No. RFCID: HKU-B2-001

Ab143
Naturally occurring antiviral drug resistance in avian H5N1 virus

CL Cheung, JM Rayner, W Wu, SY Lau, P Wang, H Tai, X Wen, W Song, B Mok, KY Yuen, JSM Peiris, Y Guan, H Chen
State Key Laboratory for Emerging Infectious Diseases, Department of Microbiology, HKU

Background: Avian H5N1 virus is endemic in poultry in some countries and continues to cause sporadic human infections in affected countries. There is concern that avian H5N1 virus or its reassortant forms may cause future pandemics. Antiviral drugs have been considered an essential component in containing and delaying the spread of virus in face of a pandemic, particularly those for which resistance is not regularly detected.

Aims: This study is designed to investigate the geographical distribution and growth properties of resistance mutations to amantadine and rimantadine in H5N1 isolates from different regions, and to explore if low frequency naturally occurring mutations associated with resistance to oseltamivir are present in H5N1 isolates and if the quasi-species may be the source for the emergence of oseltamivir resistant strains following exposure to this drug.

Results: Resistance to amantadine and rimantadine was mainly found in H5N1 viruses circulated in Vietnam and Thailand during 2004 to 2005 period. A dual mutation of Leu26Ile and Ser37Asn in the M2 gene is responsible for the resistance. While the Ser37Asn mutation has been widely found in the resistant influenza viruses to adamantanes, including a majority of the seasonal H3N2 and the pandemic 2009 H1N1 viruses, the Leu26Ile mutation is rare in influenza A virus. Analysis in the *in vitro* system found that the dual Leu26Ile and Ser37Asn mutations conferred growth advantage for the H5N1 virus, especially at the 40°C temperature. These observations suggested a possible mechanism for the expansion of mutant viruses carrying dual Leu26Ile and Ser31Asn mutations in poultry which has higher body temperature in the intestine. Resistance to adamantanes was much less in H5N1 viruses circulating in other countries including Indonesia, middle east and China, and is rarely found in Vietnam, Thailand and Cambodia since 2006, suggesting these drugs may still have prophylactic and therapeutic values for the outbreak of H5N1 virus. Resistance to the neuraminidase inhibitor, oseltamivir, was found in H5N1 virus isolated from infected patients but no avian H5N1 isolate was reported to possess known neuraminidase inhibitor resistance mutations. It is not clear whether the NA1 gene neuraminidase mutation, H274Y, originated during disease treatment or came from the avian source. We found a 2002 HK chicken H5N1 isolate contain the H274Y mutation and resistance to oseltamivir in a cell-based assay. To investigate if H274Y might naturally occur at low levels mixed with wild type in H5N1 poultry infections, we developed a differential RT-PCR assay for detecting H274Y quasi-species in H5N1 virus. Our results showed that the H274Y quasi-species is more frequently found in isolates from infected chicken than in isolates from ducks and geese, but not geographical difference was observed. We further investigated the stability and growth properties of NA 274Y mutant in culture and found that there is a host specificity of 274Y for H5N1 virus. Since both H5N1 and H1N1 virus carry genetic related NA gene, this study also investigated the mechanism for the emergence of the dominate H274Y in seasonal H1N1 and the pandemic (H1N1) virus to understand the fitness of NA gene in the N1 subtype virus.

Conclusions: This study systematically investigated the prevalence and geographic distribution of resistance to the adamantanes in avian H5N1 viruses. We identified a dual mutation, Leu26Ile and Ser31Asn, in the M2 gene, which is associated with resistance and may contribute to efficient replication of avian H5N1 virus in the intestine of aquatic birds. This study showed that there is low level of quasi-species of H274Y mutation occurring naturally in avian H5N1 viruses, which may be the source for the emergence of resistant strains in humans. These results indicate there are naturally occurring resistance mutations to antiviral drugs in avian H5N1 virus and it is important to further investigate the fitness of these mutants in avian and mammalian hosts.

Ref. No. RFCID: 06060582

Ab148
Cellular response to influenza virus infection: a potential role for autophagy in CXCL10 and interferon-alpha induction and implications in pathogenesis

AHY Law[1], DCW Lee[1], TYY Leon[1], KY Yuen[2], JSM Peiris[2], ASY Lau[1]
[1]Cytokine Biology Group, Department of Paediatrics and Adolescent Medicine, HKU
[2]Department of Microbiology, HKU

Influenza viruses of avian origin continue to pose pandemic threats to human health and have long been regarded as potential pandemic candidates despite the recent emergence of the novel swine-origin pandemic H1N1 influenza virus. Cytokine and chemokine levels were significantly elevated in human macrophages and epithelial cells

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infected with some H5N1 and H9N2 virus genotypes, when compared with the seasonal influenza H1N1 virus. We previously showed that highly pathogenic avian influenza H5N1 viruses induced cytokine dysregulation via p38 MAP kinase induction and delayed cellular apoptosis. The mechanisms underlying this cytokine and chemokine hyperinductions are not fully elucidated. In the present study, we investigated whether autophagy, a tightly regulated homeostatic process for self-digestion of unwanted and damaged cellular sub-components, may play a role in regulating cytokine induction. We demonstrated that H9N2/G1 virus induced autophagy to a greater extent when compared with seasonal H1N1 virus. This was associated with the cytokine hyperinduction caused by the virus. With inhibition of autophagy by a well-known autophagy inhibitor, 3-methyladenine or siRNA-mediated silencing of autophagy gene Atg5, we further showed that the autophagic responses were involved in the induction of CXCL10 and interferon-α expressions in primary human blood macrophages. Such induction of autophagy implies that the infected cells undergo self-repair to delay apoptotic cell death, with concomitant overexpression of cytokines. Our results may provide new insights into the pathogenic mechanisms of avian influenza viruses.

Ref. No. RFCID: 09080832

Ab154
Direct identification and quantification of host and viral microRNAs after influenza infection using the next generation ultra-high throughput DNA sequencer

A Tong[1], S Lee[2], J Bao[1], N Zhang[1], S Lok[1]
[1]Genome Research Centre, HKU
[2]Department of Microbiology, HKU

Highly pathogenic avian influenza H5N1 continues to pose a serious threat to human health, while findings have demonstrated that the intense host immune response is one of the major contributory factors to the pathogenesis of this virus. Recent studies have suggested that microRNAs may be involved in the regulation of innate immunity. However, the studies regarding this topic are still very limited and there has been no study performed to investigate the host and viral microRNAs modulation after influenza infection. In this study, we have employed human macrophages as a cell model as they are key immune cells in host defence during viral infection and to characterize and compare the microRNA transcriptomes after infection by highly pathogenic H5N1 or low virulent H1N1 influenza virus. The new generation DNA sequencers have the capacity to generate tens of millions of individual reads, which are used to quantify and compare precise levels of host and viral derived microRNAs induced by influenza A infected human macrophages at 1 h, 3 h and 6 h post infection. This approach of RNA-sequencing (RNA-Seq) offers more than two or more orders of magnitude greater sensitivity and dynamic range for quantification over the use of conventional methods for microRNA research. In addition, discovery and tabulation of novel host and viral microRNAs can also be detected, a capability that is not possible previously. Results from sequencing mRNA and microRNA will greatly contribute to the understanding of host-pathogen regulatory network that lead to pathogenesis and may provide us potential targets for the therapeutic intervention in treating influenza diseases.

Ref. No. RFCID: 08070532Ab157

Ab157
What are the roles of designated flu clinic: a cross-sectional study to review the knowledge of swine flu, disease perception and expectations in patients attended a designated flu clinic

J Wang, C Sze, KH Ngai, S Chou, E Tse, A Kwong, W Ko, W Tsui
Department of Family Medicine and Primary Healthcare, HKWC

Background: Sai Ying Pun (SYP) General Outpatient Clinic is one of the 8 designated flu clinics (DFC) managing patients with influenza-like symptoms. This study helps to review the disease perception, idea and expectations of patients, and public's understanding on the roles of DFC.

Methods: This is a cross-sectional study. Patients attended the Sai Ying Pun designated clinic would be invited to fill-in a self-administered

questionnaires in related to their knowledge of swine flu, disease perception and expectations to attend the clinic in voluntary basis. For paediatric group patients, their questionnaires would be filled in by their adult family members.

Results: Among the 420 participants, 69.7% were healthy persons and most (81.4%) were aged between 6-65 years (low risk group). The commonest presenting symptoms were similar to seasonal influenza. Rapid tests for swine flu were done for 16% participants and 25.9% (14/54) were positive. Patients who reported contact history of confirmed swine flu cases, had a significantly increased positive rate for Rapid test (4/9 vs 1/39, P=0.002). Over half (55.9%) of the participants said they were very frightened or frightened to catch swine flu. However, only 9.9% of the participants thought they may catch swine flu while attending DFC. The commonest expectations were: medical advice (85.3%), followed by medication for symptoms relief (42.8%). One third (30.4%) expected a rapid diagnostic test and this was significantly increased among patients with reported fever (45%, P<=0.001). The expectation for anti-viral treatment was low (5.1%), however, 70.8% participants reported they would like to take anti-viral treatment if they had been confirmed as having swine flu. The knowledge of complications, treatments and vaccination of swine flu was insufficient, as was the understanding of the role of the DFC. 41.4% reported they did not know the complications of swine flu. 48.1% participants believed that seasonal flu vaccine can prevent swine flu. 23.4% and 27.8% participants thought swine flu vaccine and antibiotics were the treatment for swine flu. 66.3% reported they did not know the complications of Tamiflu. 64.9% participants did not know the indication for rapid diagnostic test in DFC. 54.6% participants said they would like to take up vaccination if it was available. The acceptance of vaccination was not correlated with age, occupation, smoking status, past health or education level. The main reason against vaccination is fear about possible complications.

Discussion: The roles of DFC were not clearly understood by the public. The idea and expectations of the attendees did not match the initial planning of Hospital Authority, especially on the use of rapid diagnostic tests and Tamiflu. Although the DFC were closed in May 2010, the experience should be considered in policy and publicity strategies for future infectious disease emergencies.

Ab158
Enhancement of innate immunity to mycobacterial infection: anti-mycobacterial effect of IL-17

JCB Li, JW Fang, KKY Au, HCH Yim, ASY Lau
Cytokine Biology Group, Department of Paediatrics and Adolescent Medicine, HKU

Nowadays, *Mycobacterium tuberculosis* (MTB) is still a major threat to the world. Nearly one-third of the world's population infected with MTB resulting in 1.5–2 million deaths annually. Every year, there are approximately 12 million new cases worldwide. In Hong Kong, there are about 6000 new cases each year. Although the use of *Mycobacterium bovis* bacilli Calmette-Guerin (BCG) is effective in providing protection against tuberculosis in newborns, the efficiency in protecting adults from pulmonary tuberculosis is poor. The recent increased number of cases of tuberculosis can be attributable partly to the AIDS epidemic and the emergence of multidrug-resistant strains. These incidences stimulate the medical and scientific communities to develop more effective vaccination protocols and to look for new therapy for MTB.

IL-17 is a key pro-inflammatory cytokine produced by specific group of T lymphocytes known as T-Helper 17 (TH17) cell. The role of IL-17 in innate immunity is to protect the host from pathogen invasion through the activation and generation of neutrophils, and induction of chemokines and cytokines such as CXC chemokines, IL-6 and TNF-alpha. In recent studies, TH-17 cell and IL-17 are shown to participate in immune defence against mycobacterial infection. But the conclusion remains controversial. In light of that, we investigated the effects of IL-17and its underlying mechanisms of immunity during mycobacterial infection.

Primary blood macrophages were treated with IL-17 for 24 hours followed by BCG stimulation. Cytokine mRNA and protein levels were measured by quantitative RT-PCR and ELISA, respectively. The results demonstrated BCG treatment, but not IL-17 itself, induced the production of IL-6, IL-10 and TNF-alpha. When primary macrophages

were treated with both IL-17 and BCG, the mRNA expression and protein production of IL-6 were enhanced. Therefore, we further examined the underlying mechanisms of these processes. Our results showed that IL-17 could increase the half life of IL-6 mRNA; and consequently the cells could produce more IL-6 protein. In addition, IL-17 was found to interact with BCG-induced TNF-alpha to upregulate IL-6 production. By these two mechanisms, IL-17 could enhance the BCG-induced pro-inflammatory cytokine responses and play a role in coordinating immune response against mycobacterial infection.

Ref. No. RFCID: 09080542

Ab160
Factors affecting mycobacteria evasion of immunity: effects of HIV on cellular signalling and kinases

BKW Cheung, HCH Yim, JCB Li, ASY Lau
Cytokine Biology Group, Department of Paediatrics and Adolescent Medicine, HKU

Tuberculosis is still a major infectious disease in the world. *Mycobacterium tuberculosis* (MTB) infection infects one-third of the world's population resulting in 1.5–2 million deaths annually. In Hong Kong, there are about 6000 new cases of MTB every year. According to the WHO report, countries with high incidence rate of HIV infection also have higher incidences of tuberculosis. For hosts with normal immunity, only 10% of MTB-infected patients would develop active diseases. The remaining infected patients would develop a latent infection. Reactivation of the latent MTB occurs when the host immunity is perturbed such as in HIV infection, malnutrition, or the use of immuno-suppressive drugs. The exact mechanisms on the reactivation of tuberculosis remain unclear. Thus, co-infection of HIV with MTB or *Mycobacterium avium complex* (MAC) is major research topic of AIDS pathogenesis.

To combat mycobacteria, monocytes/macrophages produce immunoregulators such as cytokines to counteract the invasion. Our data showed that Bacillus Calmette Guerin (BCG), a mycobacterium used as a model to investigate the immune response against MTB, stimulates the induction of cytokines such as IL-6, IL-10 and tumour necrosis factor-alpha (TNF-α) in human blood monocytes. Among the cytokines induced, TNF-α plays a pivotal role in protecting the host by developing granulomas to constrain the mycobacteria. In order to investigate the underlying mechanisms of BCG-induced TNF-α, primary human blood monocytes were treated with BCG and the expression of signalling kinases including mitogen-activated protein kinases (MAPK) were assayed. The results showed that BCG could phosphorylate selected MAPK and subsequently induced TNF-α production. We further examined the role of MAPK phosphatase-1 (MKP-1), which is known to regulate MAPK activities, in BCG-induced MAPK activation and TNF-α expression. Our results demonstrated that BCG could upregulate MKP-1 expression via p38 MAPK and extracellular signal-regulated kinase 1 and 2 (ERK1/2). When MKP-1 expression was inhibited by its specific siRNA, the expression of BCG-induced phosphorylated p38 MAPK, ERK1/2 and TNF-alpha was decreased.

In conclusion, the results indicated a positive function of MKP-1 against mycobacterial infection as opposed to its usual phosphatase activity. These results provide insights into the pathogenesis of mycobacterial infection.

Ref. No. RFCID: 09080512

Ab162
Mutational analysis of H5N1 haemagglutinins: identification of molecular determinants for efficient packaging into pseudotyped lentiviral particles

D Tang, YM Lam, PCH Lam, KSL Chu, R Bruzzone, B Nal-Rogier
HKU-Pasteur Research Centre Limited, HKU

Due to the high pathogenicity of H5N1 viruses, we have developed and characterised lentiviral particles pseudotyped with HA (H5pp) from a Cambodia H5N1 isolate, which can be used as a safe tool for high-throughput serological studies without the requirement of BSL-3 facilities. However, not all H5 HAs give rise to efficient production of H5pp. The main objective of this study is to understand the intrinsic properties of H5cam and H5anh (derived from A/Cambodia/2005/40808 and A/Anhui/2005/01 respectively) which exhibited a dramatic difference in their abilities to generate H5pp; and to identify molecular determinants that control the assembly and release of H5 pseudotyped lentiviral particles.

H5cam and H5anh both exhibited high level protein expression in 293T cells. Although the cleavage of H5cam appeared to be slightly better, the level of cleaved HA2 was comparable between H5cam and H5anh. Next, flow cytometry analysis was used to compare surface HA expression for H5cam and H5anh. Indeed surface expression of H5cam was significantly higher than that of H5anh.

A deletion of lysine residue was found at the cleavage site of H5anh when compared with H5cam; in addition, H5anh contains threonine at position 533 (T533), which is located at the border between the ecto-domain and the transmembrane domain, while H5cam contains isoleucine (I533) instead. Three chimeric H5anh/c constructs were made to contain either one of the AA differences mentioned or both; and the results showed that swapping of HA2 domain (including the cleavage site) did not improve H5anh-pp production. Of notice, 8 AA residues were found different for H5cam and H5anh at the 130-loop and franking region of receptor binding domain (RBD). A series of H5anh mutants at the 130-loop region were generated for mutational analysis. Strikingly, all H5anh mutants with alanine to valine mutation at position 134, despite other sequence differences at 130-loop flanking region, largely restored the ability of H5anh to pseudotype lentiviral vector.

In conclusion, H5cam and H5anh showed similar level of protein expression in total cell lysates when transfected into 293T cells. However surface expression of H5cam was detected at a significantly higher level than that of H5anh. This may partially explain the inability of H5anh to produce H5pp. Site-directed mutagenesis revealed that a single valine residue at position 134 of the 130-loop of RBD is critical for cell surface association of H5 HA and hence efficient H5pp production in 293T cells. Our study indicated that receptor binding property of influenza HA could have an impact on its membrane targeting process.

Ref. No. RFCID 08070972

Ab182
Estimation of the effect of influenza on cardiorespiratory and all causes mortality in tropical and sub-tropical climates: a comparative study between Hong Kong, Singapore and Guangzhou for influence of seasonality and meteorological conditions

CM Wong[1], JSM Peiris[2], L Yang[1], KP Chan[1], TQ Thach[1], HK Lai[1], WWL Lim[3], AJ Hedley[1], J He[4], P Chen[5], C Ou[5], A Deng[4], X Zhang[4], D Zhou[4], S Ma[6], A Chow[7]
[1]School of Public Health, HKU
[2]Department of Microbiology, HKU
[3]Public Health Laboratory Service Branch, DH
[4]Guangdong Provincial Center for Disease Control and Prevention, Guangzhou, PRChina
[5]Department of Biotatistics, School of Public Health and Tropical Medicine, South Medical University, Guangzhou, PRChina
[6]Epidemiology and Disease Control Division, Ministry of Health, Singapore
[7]Communicable Disease Centre, Tan Tock Seng Hospital, Singapore

Background: The disease burden of influenza has been well documented in temperate countries where influenza epidemic occurs almost every winter. But few studies have provided reliable estimates for the tropics and sub-tropics where the outbreaks of influenza don't have a clear seasonal pattern.

Aims: We used the long-standing surveillance data for influenza available in three Asian tropical and sub-tropical cities: Guangzhou, Hong Kong and Singapore, to compare the excess mortality associated with influenza amid them. We also explored the role of meteorological factors in explaining the geographical heterogeneity of influenza-associated mortality.

Methods: We applied the Poisson modelling strategy to the city-specific mortality data and the year-round influenza surveillance data in three cities, in order to estimate the excess mortality associated with influenza. The virus type/subtype-specific excess mortality rate was also calculated for comparison. Fourier analysis and cross spectrum analysis were conducted to reveal the temporal association of influenza virus activity between cities. The effect modification of temperature on influenza associated mortality was assessed by the Poisson interaction models.

Results: We found slightly higher mortality rates associated with influenza in two sub-tropical cities Guangzhou and Hong Kong, compared with tropical city Singapore. This regional heterogeneity in disease burden of influenza could be explained by various meteorological conditions amid cities. Our results showed that

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influenza virus activity was likely more synchronised in two sub-tropical cities, whereas a less distinctive seasonality of influenza was found in Singapore.

Conclusions: Our results showed the mild regional heterogeneity in the disease burden and seasonality of influenza between the sub-tropical and tropical cities. Meteorological factors seem to play an important role in regulating severity of influenza outbreaks. There is a need to refine our surveillance network and design city-specific control measures against influenza especially in the sub-tropics and tropics where the effects of influenza tend to be underestimated.

Ab183
Effect modifications of lifestyle factors on risk of mortality associated with influenza in an elderly cohort

CM Wong[1], L Yang[1], KP Chan[1], HK Lai[1], TQ Thach[1], LM Ho[1], TH Lam[1], KS Ho[2], WM Chan[2], JSM Peiris[3]
[1]School of Public Health, HKU
[2]DH
[3]Department of Microbiology, HKU

Background: Influenza is a major health hazard for mortality and morbidity, causing heavy disease burden in both temperate and tropical/subtropical regions. Personal lifestyle factors may be associated with individual susceptibility to influenza infection, but how these factors change the risk of influenza associated mortality remains unexplored.

Aims and objectives: To examine the role of lifestyle factors including cigarette smoking, alcohol drinking and physical exercise as effect modifiers on influenza-associated mortality in a cohort of older population in Hong Kong.

Methods: During 1998 to 2001, a total of 66,820 (22,679 male and 44,141 female) ambulatory persons aged 65 years or older were recruited in the Hong Kong Elderly Health Services. The lifestyle and health status information of each subject was obtained during their first interview with the trained nurses or doctors. Influenza virus activity in the community was measured by weekly proportions of specimens positive for influenza A and B viruses which were obtained from the virology laboratory of the Queen Mary Hospital in Hong Kong. Vital status, and date and underlying cause of death of the subjects are ascertained from the death registration database in Hong Kong by record linkage using the unique Hong Kong identification card number. Subjects were grouped according to their smoking, alcohol drinking and physical exercise habit at the baseline. For physical exercise, daily exercise was defined for doing exercise everyday each more than 30 minutes; non-daily exercise for doing exercise not everyday or each less than 30 minutes; and never for not doing exercise at all. We used Cox regression models with time-dependent covariates to assess the excess risks of mortality associated with influenza for different lifestyle sub-groups.

Results: The estimates for excess risks associated with influenza were comparable to those obtained from our previous study using population data. For each lifestyle sub-group the excess risks (95% confidence interval) of mortality for all-natural causes associated with a 10% increase in influenza virus activity was: (a) never smoker 1.3% (-1.3,3.9), ex-smoker 4.3% (0.6, 8.3) and current smoker 3.9% (-1.2, 9.3); (b) never drinker 2.2% (-0.1, 4.6), 5.0 (-0.2, 10.5) and social/regular drinker 0.9% (-4.0, 5.9); and (c) physical exercise daily 4.8% (0.0, 9.8), non-daily 3.2% (-0.1, 6.6) and never 1.0% (-1.9, 3.9).

Conclusions: Our results further confirmed the heavy disease burden posed by influenza activity on the older people, and would provide evidence to design of the prevention measures against influenza infection, taking into account personal lifestyles, for the older population in Hong Kong.

Ab184
A study for effects of poor visbility on hospitalisation in Hong Kong

CM Wong, TQ Thach, P YK Chau, AJ Hedley
School of Public Health, HKU

Background: Visibility in Hong Kong has been deteriorating over the past 40 years with the frequency of visibility below 8km in the absence of fog, mist, or precipitation, increasing from 6.6 days in 1968 to 54.1 days in 2007.

Aims: To assess effects on acute hospital admission of daily loss of visibility.

Methods: During 1996 to 2002 we obtained hospital admission data for cardiorespiratory diseases; visibility recorded as visual range in kilometers, temperature and relative humidity. A generalised additive Poisson regression model with natural cubic regression splines was fitted to control for time variant covariates.

Results: For cardiovascular hospitalisation, an interquartile range of 6.8km decrease in visibility at lag 0–1 days was associated with an excess risk (ER%) [95% CI] of 1.19 [0.50, 1.87] for all ages and 1.48 [0.69, 2.26] for ages≥65 years ; for respiratory hospitalisation of 1.52 [0.83, 2.21] for all ages and 1.30 [0.45, 2.14] for ages≥65 years. The ER% for subcategory of ischaemic heart disease was 2.06 [0.81, 3.30] for all ages and of acute respiratory disease, acute lower respiratory infection, chronic obstructive pulmonary diseases and asthma ranged from 0.75 to 2.08 for all ages. The highest ER% was 3.86 [1.49, 6.23] for asthma followed by 2.22 [0.31, 4.13] for acute lower respiratory infection in ages 0-14 years.

Conclusion: Visibility provides a useful proxy for the assessment of environmental health risks from ambient air pollutants and a valid approach for the assessment of the public health impact of air pollution.

Implications: From a public health viewpoint our findings provide an effective means to support the development of risk perception and to communicate to policy makers, government officials, law makers, the general public and the media, the relevance of poor visibility to impaired quality of life, lost productivity and environmental health problems.

Ab206
Wheeze during the first 18 months of life: a prospective cohort study to explore the associations with indoor nitrogen dioxide, formaldehyde and family history of asthma

ITS Yu[1], AM Li2, WB Goggins[1], OSJ Leung[3], GYS Chan[4], CKC Fung[1], CK Chan[5], APS Lau[6]
[1]School of Public Health and Primary Care, CUHK
[2]Department of Peadiatrics, CUHK
[3]Family Health Service, DH
[4]Department of Applied Biology and Chemical Technology, PolyU
[5]Division of Environment, HKUST
[6]Institute of for the Environment, HKUST

Aims: To examine whether exposures to nitrogen dioxide (NO_2) and formaldehyde (HCHO) at home increase the risk of wheezing in the first 18 months of life.

Methods: Young infants born in Hong Kong during 1 April 2008 to 31 March 2009 were recruited from Maternity and Child Health Centres (MCHCs) into a prospective cohort. Parents were interviewed with the modified International Study of Asthma and Allergies in Childhood (ISAAC) questionnaire to obtain baseline information on respiratory health, as well as family and home environment characteristics when the infants were 4 months old. The indoor air levels of NO_2 and HCHO were measured in the bedrooms of the infants at 5 months old. With the aid of a respiratory health diary, parents recorded the respiratory symptoms and illnesses of the infants until they were 18 months old and reported these through monthly telephone interviews. New onset wheezing was the main outcome, and Cox's proportional hazards regression was used to document the contributions of family history of asthma, NO_2 and HCHO to the risk after adjusting for possible confounders.

Results: This preliminary report evaluated a cohort of 702 young infants. All parents of the infants completed the questionnaires. Five hundred and fifty infants (78%) with complete health diary and indoor exposure measurements on NO_2 and HCHO were available for

analysis. As at 20 June 2010, 311 infants (57%) had never wheezed and 59 (10.7%) had developed wheezing during the first 18 months of life. The remaining 180 (32.3%) were still under observation and all follow-ups would be completed by 30 September 2010.

Conclusions: In the Cox's model adjusted for NO_2, cat, dog, living area, promoxity to traffic, maternal antenatal smoking, maternal asthma, and the family history of asthma and atopy, the exposure to indoor HCHO was significantly associated with new onset of wheeze. The results suggested that every 10 units increase ($\mu g/m^3$) of HCHO increased the risk of new onset wheezing by 3% (95% CI: 0% - 7%; p=0.038), and a family history of asthma also increased the risk with a hazards ratio of 2.36 (95%CI: 1.01 – 5.51). NO_2 did not seem to have any significant effect.

Implications: The results should inform the scientific community as well as the general public of the risk of wheezing in young infants associated with indoor levels of HCHO. This can lead to corresponding mitigation measures being taken at the individual level, and has the potential to advice on policy and standard setting in the future.

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Ab212
Comparison of neurocognitive functions in individuals with obstructive sleep apnoea versus snoring in Hong Kong Chinese

EYY Lau[1], MSM Ip[2, 3], TMC Lee[1]
[1]Department of Psychology, HKU
[2]Department of Medicine, HKU
[3]Sleep Disorders Centre, QMH

Aims: Obstructive Sleep Apnoea (OSA) patients have difficulties in attention, memory, psychomotor function and executive function in Western studies. However, there were no studies of Chinese OSA populations focusing on neurocognitive functions. This ongoing study attempts to establish a neurocognitive profile of Hong Kong Chinese with OSA.

Methods: Chinese patients with moderate to severe OSA (n=29) and a snoring group (n=17) were recruited from the Sleep Disorders Centre of Queen Mary Hospital (QMH). All subjects were assessed with paper-and-pencil tests of their neurocognitive function, computerised testing of working memory, and questionnaires on sleepiness (Epworth Sleepiness Scale, ESS), sleep quality (Pittsburg Sleep Quality Index), and functional outcomes (Functional Outcomes of Sleep Questionnaire); and all underwent overnight polysomnography (PSG) at QMH. Between-group comparisons and norm comparisons were used to reveal neurocognitive deficits and daytime functions in the OSA group; relationships between neurocognitive performance and functional outcomes and sleepiness, sleep quality, and hypoxaemia levels (Apnoea Hypopnoea Index, AHI and minimum oxygen saturation, SpO2) were explored with correlational analyses.

Results: The OSA group showed significantly poorer spatial attention (Spatial Span-forward) and visual learning (Brief Visual Memory Test, BVMT-total recall) than the snoring group. In contrast, the snoring group showed worse performance on colour naming and word reading (Stroop Test). The two groups did not differ on tests requiring complex attention, before or after basic attention was controlled. In comparison with norms, elevated number of participants in both groups showed excessive lapses of attention (Psychomotor Vigilance Test), difficulties in verbal learning and recall (Rey Auditory Verbal Learning Test, RAVLT), and visual learning (BVMT), while only the OSA group showed deficits in spatial attention (Spatial Span-forward), verbal recognition (RAVLT), visual delayed recall (BVMT), and mental-set shifting (Colour Trails-interference). For the OSA group, moderate correlations were found between sleepiness and performance on verbal recognition (RAVLT), and neurocognitive deficits were not associated with hypoxaemia levels or sleep quality. Both groups showed excessive sleepiness, sleep quality problems, and poor functional outcomes according to clinical cut-offs.
Conclusions: Neurocognitive deficits were found in both OSA group and snoring group. While both groups showed comparable sleepiness and sleep quality, more cognitive deficits were found in the OSA group, suggesting the potential role of specific OSA pathologies in affecting cognitive functions, above and beyond the effects of disturbed sleep. Our study highlights the importance of assessing and devising interventions targeting neurocognitive functions in treatment of OSA.

Ab216
Working memory and academic achievement in Chinese children with obstructive sleep apnoea

WM Choi[1], SK Lau[1], EYY Lau[1], AM Li[2,3]
[1]Department of Psychology, HKU
[2]Department of Paediatrics, CUHK
[3]Sleep Disorders Clinic, PWH

Aims: The hypothesis of this study is that children with Obstructive Sleep Apnoea (OSA) have neuropsychological deficits in working memory (WM) and lower levels of academic achievement, compared with healthy controls.

Methods: This is a prospective study for baseline assessment of WM functions and academic achievement in children. Chinese children with OSA (n=12), and healthy gender-, age- matched controls (n=12) were recruited from the Sleep Disorders Clinic, Prince of Wales Hospital, Hong Kong. All children were assessed with verbal/spatial n-back tasks, digit- and spatial-span tasks tapping on Baddeley's WM model components, and standardised academic assessment tools on Chinese reading-comprehension and arithmetic skills. All underwent overnight polysomnographic sleep study (PSG). Between-group comparisons were used to reveal deficits in WM and academic attainment in the OSA group and relationships between WM and academic attainment in the OSA group were explored with correlational analyses.
Results: Children with OSA had significantly more problems than healthy controls on verbal 0-back task [t(22)=2.656, p=0.017, d=1.084). They scored significantly lower on academic achievement test that measures arithmetic skills [t(22)=2.150, p=0.043, d=0.876). Strong correlation was found between verbal working memory functions and arithmetic test performance among OSA children (r=0.704, p=0.011).

Conclusions: Impairments in verbal working memory and arithmetic skills were found in OSA children and the two were highly correlated. Further investigations into specific predictors of working memory and its related deficits and potential intervention strategies are crucial to reduce long-term adverse effects of OSA in children's cognitive development and learning.

Ab221
Viral shedding, natural clinical history and transmissibility of influenza

LLH Lau[1], BJ Cowling[1], VJ Fang[1], KH Chan[2], EHY Lau[1], CKY Cheng[1], JSM Peiris[2], GM Leung[1]
[1]School of Public Health, HKU
[2]Department of Microbiology, HKU

Background: Influenza virus is responsible for considerable morbidity and mortality worldwide. A comprehensive understanding of viral shedding and clinical history in infected individuals is essential for pandemic and epidemic mitigation and prevention. The majority of data on viral shedding are derived from volunteer challenge studies, through the course of experimental viral infections in healthy screened individuals. There are very few data on viral shedding among individuals who naturally acquire the influenza virus.

Methods: A large community-based study was conducted in Hong Kong in 2008 to analyse the efficacy of non-pharmaceutical interventions to prevent household transmission of influenza. Households were recruited when a household member presented with symptoms of influenza-like illness (ILI) and tested positive for influenza by rapid antigen test. The household was then followed up for approximately 7 days in a series of 3 home visits. Nasal and throat swabs (NTS) were collected from every household member and tested with reverse transcriptase polymerase chain reaction (RT-PCR) and quantitative viral culture to determine viral load. Data on natural clinical history was collected through symptom diaries kept by every subject over the follow-up period. Pooled trends of viral shedding, symptoms and tympanic temperature were analysed by time since illness onset.

Results: The trends of the natural clinical history were similar to trends of viral shedding in influenza A and B virus infections measured by both RT-PCR and quantitative viral culture. Viral loads were found to peak on the day of symptoms onset for influenza A virus infections and steady decline to undetectable levels around 7 days later. In influenza B virus infections, viral load rose 2 days prior to symptoms onset and fluctuated for around 9 days before declining. The majority of viral shedding was detected in the first 2-3 days post-symptom onset, and we estimated that 1-8% of infectiousness is pre-symptom onset. Among subjects with detectable viral shedding by RT-PCR, 14% were asymptomatic.

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Conclusions: We determined that if transmissibility of an infected individual is related to the viral shedding profile over time, the majority of infective period occurs 1-2 after onset of acute respiratory illness (ARI). The trends and time lines of natural clinical history and viral load found in our study were comparable to that found in volunteer challenge studies. The proportion of asymptomatic infected individuals was lower than in some other studies, and suggests that "silent spreaders" of influenza virus might be less common than previously believed.

Ref. No. RFCID: 08070632

Ab222
Surveillance surveys on population-based responses to human swine influenza in Hong Kong

BJ Cowling, DMW Ng, DKM Ip, Q Liao, WWT Lam, JT Wu, R Fielding
School of Public Health, HKU

Background: In April 2009, a novel influenza A (H1N1) virus emerged in Mexico and rapidly spread around the world, and the WHO declared a pandemic (H1N1pdm) in early June. Prior to the availability of an effective vaccine, strategies to mitigate the impact of the pandemic typically involved antiviral treatment of cases, and 'non-pharmaceutical' community interventions such as hand hygiene, face masks and social distancing.

Methods: A series of 13 surveys was conducted between April and November 2009, covering the entire first wave of 2009 H1N1pdm. A total of 12,965 participants were recruited via random-digit dialling of all land-based telephone numbers in Hong Kong, where landline telephone penetration exceeds 98%. Within each household, one adult (age≥18) living in the house at least 5 days per week was randomly selected for an interview based on a Kish grid. Demographic characteristics of the participants were compared to reference population data provided by the HKSAR Government. Means and proportions of survey items were directly weighted by sex and age to the general population. Multivariable logistic regression was used to examine the factors affecting the use of preventive measures.

Results: Participants reported low anxiety levels and a gradual decline in perceived worry if infected throughout the pandemic. Perceived susceptibility to infection and perceived severity of H1N1pdm were initially high but declined early in the pandemic and remained stable thereafter. As the pandemic grew, knowledge on modes of transmission did not improve, the adoption of hygiene measures and use of face masks was relatively stable with slightly decreasing trends, while social distancing showed a downward trend following an increase after the confirmation of non-imported cases.

Conclusions: This study illustrates that the H1N1pdm failed to generate significant self-protective responses among the Hong Kong community. Anxiety levels showed no association with episodic events such as the first reported H1N1pdm death in Hong Kong or increasing incidence. This suggested that for most people, H1N1pdm was a background phenomenon of little concern, perhaps because of the memory of SARS in 2003, and because the public were initially reassured by government actions. The lack of substantial changes in hygiene behaviors during the height of the pandemic suggested that government attempts at improving community hygiene made little contribution to mitigation of pandemic influenza in Hong Kong. Our results highlight the difficulty of relying on community mitigation measures during a pandemic.

Ref. No. RFCID: PHE-1+10

Ab223
Influenza viral load versus rapid diagnostic test performance in a community setting

CKY Cheng[1], BJ Cowling[1], KH Chan[2], VJ Fang[1], WH Seto[3], R Yung[4], TM Uyeki[5], PM Houck[6], JSM Peiris[2], GM Leung[1]
[1]School of Public Health, HKU
[2]Department of Microbiology, HKU
[3]Department of Microbiology, QMH
[4]Centre for Health Protection, DH
[5]Influenza Division, Centers for Disease Control and Prevention (CDC), Atlanta, GA, USA
[6]Seattle Quarantine Station, Division of Global Migration and Quarantine, CDC, Seattle, WA, USA

Background: Rapid diagnostic tests for influenza infections can be useful to facilitate timely and optimal treatment of seasonal influenza, and in a pandemic scenario could potentially be important in control and mitigation. We evaluated the performance of the QuickVue Influenza A+B test (Quidel Corp., San Diego, USA) in Hong Kong community and investigated the viral load and other factors affecting test sensitivity.

Methods: We recruited 1,008 subjects who were older than 2 years old with at least 2 influenza-like symptoms between February and September 2007 from 30 outpatient clinics in Hong Kong. Each subject provided two pooled pairs of nose and throat swab specimens; one pair was tested by the QuickVue rapid test on site, the other pair was sent to a laboratory for reference tests. We used viral culture as the reference for all subjects and in a random sample subset of 117 subjects, quantitative RT-PCR was used for quantifying the viral load of influenza viruses.

Results: Among 998 enrolled subjects with valid results, the rapid test had overall sensitivity of 0.68 and specificity of 0.96 using viral culture as reference. Factors tended to increase the sensitivity of the test include fever, paediatric age, earlier symptom onset and tested by clinics with staff that had more experience using the test. Sensitivity for both influenza A and B was significantly higher for specimens with viral loads greater than 5 log10 copies/ml.

Conclusions: The QuickVue Influenza A+B test has similar sensitivity in point-of-care community settings to more controlled conditions. Previous studies also suggested that the test performance were similar for pandemic influenza A/H1N1 2009 and seasonal influenza. The high specificity of the QuickVue test could make it very useful for allocation of antivirals for treatment of a case with confirmed influenza or for prophylaxis of their close contacts. Furthermore, given the link between test sensitivity and viral load and the hypothesis that individuals with higher viral load may be more infectious, rapid influenza tests may become indispensible to control measures in a pandemic.

Ref. No. RFCID: HKU-AA-022

Ab224
Effectiveness of entry screening to delay introduction of pandemic influenza

BJ Cowling[1], LLH Lau[1], W Peng[1], HWC Wong[2], VJ Fang[1], S Riley[1], H Nishiura[3,4]
[1]School of Public Health, HKU
[2]Imperial College London, London, UK
[3]Theoretical Epidemiology, University of Utrecht, Utrecht, The Netherlands
[4]PRESTO, Japan Science and Technology Agency, Saitama, Japan

Background: Following the outbreak of pandemic influenza H1N1 in April 2009, the WHO rapidly escalated the classification of the pandemic alert level to 5. As a result, health agencies from different nations implemented screening procedures at borders and entry points such as airports, ports and border crossings in an attempt to delay local transmission.

Methods: The entry screening methods implemented by different nations were analysed and grouped. The date of first laboratory-confirmed imported H1N1 case and first untraceable or local case of H1N1 was ascertained through an internet search of official national health ministry websites and the media. The additional delays between these dates were compared between nations that screened and did not screen.

Results: There were four main methods of entry screening implemented by the countries analysed, onboard temperature checks, health declaration forms, symptom screening and thermal scanners. Two nations implemented all four methods, and five did not implement any. Implementation of a entry screening method or any combination were associated with on average additional 7-12 day delays in local transmission in contrast to nations that did not implement any screening method. The 95% confidence interval had lower bounds of no additional delays to the upper bounds of 20-30 additional days.

Conclusions: The findings of our study suggest that the implementation of entry screening methods could delay local transmission of influenza A H1N1 for approximately 1-2 weeks on average. It might be beneficial to delay the local entry of a virus to allow for better healthcare planning and preparation and implementation of other prevention options such as school closures, although entry screening is resource intensive.

Ref. No. RFCID: HK-09-04-04

Ab225
Estimation of the serial interval of influenza

BJ Cowling[1], VJ Fang[1], S Riley[1], JSM Peiris[2], GM Leung[1]
[1]School of Public Health, HKU
[2]Department of Microbiology, HKU

Background: Estimates of the clinic-onset serial interval of human influenza infection (time between onset of symptoms in an index case and a secondary case) are used to inform public health policy and to construct mathematical models of influenza transmission. We estimated the serial interval for inter-pandemic influenza during the 2007 season in Hong Kong.

Methods: In a recent household transmission study, we recruited 122 index outpatients with positive rapid test results for influenza and followed-up their households with 4 home visits within the subsequent 10 days. Nose and throat swabs were collected from all household members at each home visit and tested for influenza by viral culture or reverse transcription polymerase chain reaction (RT-PCR). The index cases reported the date of first influenza-like-illness symptoms at recruitment and all household members were required to record daily symptom diaries. Symptom onset was defined as the first day when the subject reported at least 1 of 5 symptoms and signs: fever (37.8°C or higher), cough, headache, sore throat, or pains in muscles or joints. To estimate the serial interval, we fitted parametric and non-parametric models allowing for left truncation.

Results: 21 of 350 household contacts were laboratory confirmed influenza infection and only 14 (67%) contacts experienced any of the 5 symptoms or signs. We fitted Weibull, gamma and lognormal parametric models, which all agreed with non-parametric estimates. Whereas the AIC slightly favored the Weibull model with a mean serial of 3.6 days (95% CI: 2.9-4.3 days). We used the parametric bootstrap approach with 1000 resamples to calculate confidence intervals. In sensitivity analysis we used mixture models to incorporate risk of community transmission and estimates of the serial interval were unchanged.

Conclusions: The household serial interval of influenza may be longer than previous estimates based on similar study designs. A strength of our study is secondary cases were confirmed by laboratory testing. If and when larger datasets become available, it would be interesting to compare estimates of the serial interval for transmission in different settings and to investigate heterogeneities in serial interval due to infector characteristics, infectee characteristics, or virus type or subtype.

Ref. No. RFCID: HKU-AA-023

Ab227
Social-cognitive factors and personal hygiene practices to protect against avian influenza A/H5N1 and 2009 pandemic A/H1N1 in Hong Kong

Q Liao, BJ Cowling, WWT Lam, R Fielding
School of Public Health, HKU

Aims: To examine if trust in influenza-related information from different sources – institutional, including government and media messages about influenza, and interpersonal, actions and opinions of other people – act through common social-cognitive factors to associate with personal hygiene practices to protect against both avian A/H5N1 and pandemic A/H1N1 influenzas.

Methods: Utilising comparable data from surveys on risk perception and behaviour from 2006 A/H5N1 and 2009 A/H1N1 episodes, Structural Equation Modelling (SEM) was performed to test a theoretical model incorporating elements of the Health Belief Model and the Theory of Planned Behaviour. The SEM model, incorporating information trust, social-cognitive factors and personal hygiene practices during avian H5N1 influenza epidemic (A/H5N1) in 2006 was tested and optimised, and then applied to comparable data from the influenza A/H1N1 pandemic in 2009 (A/H1N1). For both influenzas, trust in institutional information was associated with higher perceived effectiveness of hygiene practices in controlling influenza, while trust in interpersonal information was associated with greater disease worry. Trust in institutional information was also positively associated with disease worries for A/H5N1 only and positively associated with influenza knowledge for A/H1N1 only. Subsequently, for both influenzas, better influenza knowledge and perceived effectiveness of hygiene practices were associated with more hygiene practices. Greater disease worry was associated with more hygiene practices for A/H5N1 but not for A/H1N1.

Discussion: The SEM demonstrated many similarities between the two influenza episodes but also highlighted differences. These data reflect the likely role of perceived seriousness or degree of threat in decisions to adopt preventive practices. We suspect that when public uncertainty about the nature of the threat is high, or when trust in institutional information is low, then informal sources of information, such as how other people are behaving are likely to be cues to action for persons with high levels of influenza-related worry. Our study highlights the importance of providing trustworthy information to the public during influenza epidemic which could improve public knowledge about the disease and their efficacy belief of the preventive measures and subsequently improve adoption of preventive behaviours. Behaviours and attitudes from other people may provide important threat-related information to inform decision-making, particularly in the Chinese culture. However, behavioral change associated with cues from others might only occur if the disease worry or perceived threat exceeds a triggering threshold.

Ref. No. RFCID: 09080732

Ab229
The transmission of tuberculosis in Hong Kong: role of demographic factors and relative contribution of primary infection, exogenous re-infection and endogenous reactivation

EHY Lau[1], LM Ho[1], CC Leung[2], S Riley[1]
[1]School of Public Health, HKU
[2]Tuberculosis and Chest Service, DH

Background: Hong Kong is an affluent sub-tropical city with a well-developed healthcare infrastructure but an intermediate tuberculosis (TB) burden. However, the fairly rapid decline in tuberculosis incidence through the 1960s and 1970s has now appeared to reach a plateau in Hong Kong.

Methods: In this study, we assessed the contribution of exogenous infections, re-infections and endogenous reactivations, as well as changes in demographics and population movement, to explain the observed trends in TB incidence in Hong Kong since 1960. Specifically, we studied the transmission dynamics of TB in Hong Kong to explore the factors underlying recent trends in incidence by fitted an age-structured compartmental model to TB notifications in Hong Kong between 1968 and 2008. The model was used to quantify the proportion of annual cases due to recent transmission versus endogenous reactivation of latent infection, and to project trends in incidence rates to 2018.

Results: The proportion of annual TB notifications attributed to reactivation increased from 46% to 70% between 1968 and 2008. Age-standardised notification rates were projected to decline to approximately 56 per 100 000 in 2018.

Conclusions: Continued intermediate incidence of TB in Hong Kong is driven primarily by endogenous reactivation of latent infections. Public health interventions which focus on reducing transmission may not lead to substantial reductions in disease burden associated with reactivation of latent infections in the short- to medium-term. While a well-implemented effective treatment programme and active disease detection system may be effective in settings with high transmission, in the long-term and in developed settings it may also be important to focus on early detection of potentially reactivated disease, and screening to identify individuals with latent TB infection followed by treatment to prevent endogenous reactivation to active disease.

Ref. No. RFCID: 09080802

Ab230
Comparing the SARS epidemics in Hong Kong, Taiwan and Beijing

EHY Lau, BJ Cowling, LM Ho, GM Leung
School of Public Health, HKU

Background: The 2002-2003 Severe Acute Respiratory Syndrome (SARS) outbreak infected 8,422 individuals leading to 916 deaths around the world. However, there have been few epidemiological studies of SARS comparing epidemiologic features across regions.

Methods: We present a comparative epidemiologic analysis of SARS, based on a most comprehensive dataset to date including 3,324 SARS patients from Hong Kong, Beijing and Taiwan. Epidemiological and clinical characteristics such as onset-to-admission, onset-to-discharge and

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onset-to-death period, case fatality rate (CFR) and presenting symptoms are described using multivariable logistic regression models. We further explored the influence of demographic and clinical variables on the remarkable differences in CFRs between the three regions.

Results: The crude CFRs for Hong Kong Beijing and Taiwan are 17.2%, 3.3% and 27.5% respectively, while the age-sex standardised CFRs are 10.6%, 4.5% and 18.8%, respectively, showing that part of the differences can be explained by demographical heterogeneity. After adjusting for the clinical and demographical factor, older age, non-HCWs, presence of pre-existing co-morbid conditions and admission before symptom onset was found to be significantly associated with mortality. We also found common features such as shortening of onset-to-admission periods through the epidemic.

Conclusions: This study confirms the heterogeneous CFRs in Hong Kong, Beijing and Taiwan, which cannot be fully explained by demographical and clinical factors. For all regions, the onset-to-admission periods shortened with Beijing and Taiwan having more patients admitted within 1 day when compared to Hong Kong, which has likely been benefited from the information and experiences from other regions with earlier SARS outbreaks. This study was only made possible with an integrated dataset from three different regions, where similarities and differences across regions could be identified. A standardised data collection platform is important during outbreaks of newly emerging diseases to facilitate identification similarities and explain differences, which is critical to evidence-based clinical and public health decision.

Ref. No. RFCID: HKU-AA-017

Ab235
Estimating the efficacy of treatments for SARS in Hong Kong

EHY Lau, BJ Cowling, LM Ho, GM Leung
School of Public Health, HKU

Background: In the severe acute respiratory syndrome (SARS) epidemic, ribavirin and corticosteroids were the main choice of treatment in Hong Kong. While randomised controlled trials were infeasible during the epidemic, many studies based on observational data were inconclusive due to small sample size or lack of control for potential confounders or treatment selection bias.

Methods: We analysed clinical data from all 1,755 SARS patients in Hong Kong to assess the treatment efficacy of the combined therapy of ribavirin and corticosteroids, using propensity score method to adjust for potential confounders and reduce treatment selection bias.

Results: The adjusted excess case fatality ratios of SARS patients receiving the combined treatment of ribavirin and corticosteroids within 2 days of hospital admission, compared with those receiving neither treatment within 2 days of hospital admission, were 3.8% (95% confidence interval: -1.5%, 9.2%). The result suggests that the combined treatment has no significant beneficial effect in the initial treatment of SARS patients.

Conclusions: Our results suggest that a higher but insignificantly different estimated CFR was found in SARS patients treated with both ribavirin and corticosteroids within 2 days of hospital admission, comparing to those receiving neither drugs within 2 days of hospital admission. Since evidence based on randomised controlled trials will not be immediately available in case of the re-emergence of SARS. Our study provides evidence-based assessment based on best available data to inform treatment decision of SARS. For uncontrolled observational study of drug efficacy, particular in epidemic of newly emerging diseases where planned experiment is not feasible, proper adjustment for potential confounders is needed to accurately assess treatment effects.

Ref. No. RFCID: HKU-AA-018

Ab236
Real time estimation of the effective reproductive number in the presence of reporting delay, Hong Kong novel influenza A/H1N1 epidemic

BJ Cowling[1], SY Lau[1], LM Ho[1], SK Chuang[2], T Tsang[2], SH Liu[3], PY Leung[3], SV Lo[3,4], EHY Lau[1]
[1]School of Public Health, HKU
[2]CHP, DH
[3]HA
[4]FHB

Background: The first novel influenza A/H1N1pdm case in Hong Kong was confirmed on 1 May 2009. The disease continued to spread and by mid-September, there were over 20,000 laboratory confirmed cases. Local health authority switched control strategy from containment phase to mitigation phase by the end of June. The change in transmissibility of H1N1pdm and effectiveness of control measure can be assessed by the effective reproductive number (R_t). However, laboratory confirmation of H1N1pdm cases may take up to a week causing reporting delay in the number of onset cases. While the reporting delay is relative long comparing to the serial interval of about 3 days for H1N1pdm, it is crucial that the reporting delay is properly adjusted for to obtain timely estimate.

Methods: We extended previous methods and estimated the real time R_t in the Hong Kong H1N1pdm epidemic based on all confirmed cases since late May, 2009, adjusted for reporting delay. The reporting delay distribution was estimated, based on which missing onset days were imputed and delay-reported onset cases were properly adjusted. We also allowed for imported cases to be infectors but not infectees. As there could be less reported cases when changing from containment phase to mitigation phase, we further estimated R_t based on hospitalised patients confirmed with influenza A/H1N1pdm.
Results: R_t declined from around 1.4-1.5 at the start of the local epidemic to around 1.1-1.2 later in the summer, suggesting changes in transmissibility perhaps related to school vacations or seasonality. Estimates of R_t based on hospitalizations of confirmed H1N1 cases closely matched estimates based on case notifications.

Conclusions: Real-time monitoring of the effective reproduction number is feasible and can provide useful information to public health authorities for situational awareness and calibration of mitigation strategies.

Ab253
Predictors of pneumococcal vaccination rate though health education among Hong Kong chronic patients

S Chan, D Leung, A Leung, I Hung, TH Lam, YK Yuen
HKU

Background: *Streptococcus pneumoniae* causes invasive pneumococcal diseases (IPD) in all age groups, especially the elderly. The 23-valent pneumococcal polysaccharide vaccine (PPV) is efficacious in reducing the risk of systemic infection and preventing mortality due to *S. pneumomiae*. PPV is relatively new to Hong Kong and, as recommended by WHO, the Hong Kong Government has advised the community to take PPV for personal protection for those at risk of severe IPD including persons at extremes of age (children 6 weeks to 2 years of age and elders aged 65 years or above), nevertheless the uptake was low.

Methods: A clustered randomised controlled trial was conducted in 5 outpatient clinics (three GOPCs and two SOPCs) in the West Cluster of the Hospital Authority for 10 weeks between December 2007 and March 2008. We recruited 2,517 patients aged 65 years or above with at least one chronic disease from the five clinics. Trained research nurses or medical/nursing students provided a specially designed low-intensity health education intervention to motivate the elderly clients to receive PPV at their clinic visit. The intervention included a telephone prompt 1 week prior to the client's scheduled medical appointment and a booster face to face intervention on-site at the clinic. We also displayed posters, distributed promotional leaflets, and showed a special designed educational video in all the 5 clinics during the study period. The primary outcome was the PPV uptake rate among the targeted patients as recorded in the HA Clinical Management System (CMS).

Results: A significantly larger proportion of subjects in the intervention group had the vaccination compared to the control group (57% vs. 48%; p=0.016). By Generalised Estimating Equations to adjust for the clustering effect, we found that younger in age (Adjusted relative risk, ARR=0.993, 95% CI=0.987-0.999), had vaccination before

(ARR=1.19, CI=1.10-1.30), and being in the intervention group (ARR=1.23, CI=1.07-1.40) were independent predictors of PPV uptake among the subjects.

Conclusions: A low intensity health education intervention, in addition to the standard care of distributing leaflets, posters, and showing video, was effective in motivating the elderly with chronic diseases to receive PPV. In addition to receiving the health education intervention, 'had vaccination before' is also an important predictor for PPV vaccination. The observation may be explained by the reduction in fear of taking up a new vaccination if the elderly had prior experience. The results suggest that the Government should put more effort in promoting all kind of vaccinations that can improve the health of the elderly on a regular basis.

Ab264
The CD209 (DC-SIGN) -336A>G and MxA -123C>A promoter polymorphisms in Severe Acute Respiratory Syndrome coronavirus infection in Hong Kong Chinese

US Khoo, KYK Chan, JCY Ching, MS Xu, KM So, ST Lai, CM Chu, L Yam, TY Wong, PH Chung, VS Chan, P Tam, SP Yip, CL Lin, P Sham, GM Leung, JSM Peiris
Department of Pathology, HKU

CD209 (DC-SIGN) is an important C-type lectin which acts a receptor of many pathogens. The single nucleotide polymorphism (SNP) -336A>G in the CD209 promoter has been demonstrated to regulate promoter activity and to be associated with several important infectious diseases, such as HIV-1, M. tuberculosis and Dengue fever. CD209 facilitates severe acute respiratory syndrome (SARS)-coronavirus spike protein-bearing pseudotype driven infection of permissive cells in-vitro. Myxovirus resistance-A (MxA) is an antiviral protein induced by interferon (IFN)-α/β, which can inhibit viral replication. The minor alleles of the -88G/T and -123C/A MxA promoter SNPs are associated with increased promoter activity and altered response to IFN-α/β treatment.

By electrophoretic mobility shift assay and luciferase reporter assay, we confirmed that the DC-SIGN -336G promoter SNP provided a less effective binding of nuclear extracts with lower promoter activity, which could lead to reduced DC-SIGN protein expression. Genetic association analysis of this SNP with clinico-pathological outcome in 824 serological confirmed SARS patients showed that the -336AG/GG genotype in SARS patients was associated with lower lactate-dehydrogenase (LDH) levels compared with the -336AA patients (p=0.014, OR=0.40). High LDH levels are known to be an independent predictor for poor clinical outcome, probably related to tissue destruction from immune hyperactivity. Hence, SARS patients with the CD209 -336AA genotype carry a 60% chance of having poorer prognosis. This association is in keeping with the role of CD209 in modulating immune response to viral infection and may contribute to reduced immune-response with reduced lung injury in the progression of SARS infection.

By similar in-vitro assays, we also showed the -123A minor allele provided stronger binding-affinity to nuclear-proteins extracted from IFN-β-untreated cells than the wild-type allele. The -88T allele in contrast, showed preferential binding following IFN-β stimulation. Endogenous IFN-α/β induction can be suppressed in severe acute respiratory syndrome-coronavirus (SARS-CoV) infection. Genetic-association study using the same large case-control cohort confirmed that -123A minor-allele carriers was significantly associated with lower risk for SARS-CoV infection whilst -88G/T was insignificant after adjustment for confounding effects. This suggests that -123C/A plays a more important role in modulating basal MxA expression, contributing more significantly to innate immune response against viral infections which suppress endogenous IFN-α/β induction such as SARS-CoV. These findings may have implications for other infectious diseases in which viral-induced cell death and/or immune response contribute significantly to outcome. By knowing the genotype of patients, prediction of risk or clinical outcome with suitable preventive measures or advance treatment could be offered.

Ref. No. RFCID: 04050252

Ab266
Intradermal 2009 pandemic influenza A (H1N1) vaccination as a strategy for dose and adjuvant sparing

KKW To[1], IFN Hung[1], Y Levin[2], P Li[1], C Li[1], KH Chan[1], KY Yuen[1],
[1]State Key Laboratory for Emerging Infectious Diseases, Carol Yu Centre for Infection and Division of Infectious Diseases, HKU, QMH
[2]NanoPass Technologies Ltd, Israel

Background: The 2009 pandemic influenza have illustrated the difficulties in mass producing vaccines in a short period of time. Dose-sparing seasonal influenza vaccine delivered via a novel intradermal microneedle has demonstrated good immunogenic responses similar to full-dose intramuscular vaccination. We sought to assess the safety and immunogenicity of low-dose intradermal immunisation of the monovalent 2009 influenza A(H1N1) vaccine.

Methods: This is a prospective, randomised, parallel-group single-centre trial conducted between January to March 2010. We compared the safety and immunogenicity of a single low-dose (3μg haemagglutinin) intradermal (ID) administration to a single full-dose (15μg) intramuscular administration (IM). The vaccine used is Panenza (Sanofi Pasteur, France), a monovalent inactivated, non-adjuvanted vaccine formulated to contain 15μg haemagglutinin (HA) of influenza A/California/07/2009 (H1N1) virus. We recruited chronically ill adults aged 21 and above. These populations were chosen because they were qualified for the Hospital Authority/Centre for Health Protection mass vaccination programme for the 2009 influenza A (H1N1) immunisation campaign. Serological analysis by haemagglutination inhibition (HI) and microneutralisation assay was performed at baseline, and on days 21 and 42. Seroprotection was defined as $>= 40$ HI titre. Seroconversion is defined as a 4-fold rise in HI titre. The study was approved by the institutional review board of the Hospital Authority of Hong Kong and was registered with ClinicalTrials.gov (NCT01049490).

Results: A total of 37 subjects were enrolled, of which 35 completed the study. Two subjects from the IM group were lost for follow-up. HI seroprotection rates at day 21 were 27.8% and 29.4% in the low dose ID and the full dose IM groups, respectively. Seroconversion rates by HI assay in the ID and IM groups were 27.8% and 26.3%, respectively. Day 21 geometric mean titre (GMT) (95% CI) in HI was 22.5 (3.8-41.2) and 21.7 (3.6-39.7) and day 42 GMT (95% CI) was 23.3 (2.6-43.9) and 17.7 (2.0-33.3) in ID and IM groups, respectively. GMT fold increases in the ID and IM groups were similar (1.6 and 1.9 respectively). Similar results were observed at day 42 post vaccination with comparable seroprotection and seroconversion rate (38.9% and 35.3% for ID and IM, respectively). GMT fold increases were generally low (ID: 1.6 and IM: 1.9 at 21 days, and ID: 1.8 and IM: 1.6 at 42 days). No serious adverse events related to vaccination were found. Local symptom of post vaccination erythema was significantly more common in the ID group (61.1% of subjects vs. 0% in the IM group, p<0.001) while other local and systemic symptoms (e.g., swelling, headache and malaise) were reported in similar frequency in both the IM and ID groups. All events were only mild to moderate in intensity.

Conclusions: Dose-sparing 2009 pandemic influenza A (H1N1) immunisation via intradermal route was equivalent in all immunogenicity markers at 21 days to full dose IM in adult patients suffering from a chronic disease, with mild to moderate vaccine-associated reactions. This may be a feasible option in future pandemics, especially when there is short supply of vaccine.

Ref. No. RFCID: 10090242

Ab267
Detection of WU and KI polyomaviruses from patients with acute respiratory tract infections in Hong Kong

ASY Wong, YL Kwong, AYH Leung
Department of Medicine, HKU

Background: Human polyomaviruses BK and JC are endemic in human population. Primary infection is asymptomatic and the viruses remain latent. During immunosuppression, they undergo reactivation, resulting in graft nephropathy and haemorrhagic cystitis in renal and bone marrow transplantation recipients (BK virus) and progressive multifocal leukoencephalopathy in HIV patients (JC virus). Recent studies in Australia, United States and Sweden have identified two novel human polyomoviruses, the KI and WU viruses, from patients with acute respiratory tract infection (ARTI). It remains unclear if these viruses reactivate from latent infection and if such infection occurs in Hong Kong.

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Aims: We hypothesised that the novel KI and WU viruses may be identified in the respiratory tract of people in Hong Kong and they may remain dormant in the respiratory tract of patients without ARTI. Furthermore, their reactivation may play a pathogenetic role in ARTI.

We aimed to test the above hypotheses by examining the prevalent rates of these viruses in the lower respiratory tract of patients with normal or impaired immunity with or without ARTI.

Methods: We collected BAL samples and clinical data from 260 patients who underwent bronchoscopy in Queen Mary Hospital. DNA was extracted from these samples and the polymerase chain reaction (PCR) conditions have been optimised and performed using specific primers which amplify the VP2 and VP1 regions of the WU and KI viruses.

Results: Of the 260 samples examined, three (all female, aged 31, 52 and 61) were positive for WU virus in whom two were immunocompetent without ARTI who underwent BAL for investigation of lung shadow. The other patient suffered from lymphoma and has received bone marrow transplantation from matched unrelated donor. She underwent BAL for severe pneumonia. The KI virus was not identified in any of the samples recruited so far.

Conclusions: The occurrence of WU virus in the lower respiratory tract was uncommon in Hong Kong (1.15%). The virus can be identified in immunocompetent patients without respiratory infection, suggesting occult infection of the lower respiratory tract. The occurrence of KI virus in the lower respiratory tract was even rarer.

Ref. No. RFCID: 08070552

Ab268
Cellular pathogenesis of human swine influenza

PKS Chan, WY Lam
Department of Microbiology, CUHK

Background: A previously unknown strain of influenza A H1N1 has emerged in Mexico and the United States around March and April 2009. Previous data on human infection with avian influenza virus indicate that cytokine storm is a key mediator, as well as a predictor, for adverse clinical outcome. This study aims at improving our understanding on the pathogenic mechanism of the newly emerged strain as well as for influenza virus in general.

Aims: To compare and contrast qualitatively and quantitatively the cytokine/chemokine induction and apoptosis response between human swine influenza H1N1 (S-OIV) and other representative influenza strains including highly pathogenic avian influenza virus H5N1, H7N3, low pathogenicity avian influenza virus H9N2, seasonal flu H1N1 and an H2 subtype virus.

Methods: This study will use an in-vitro human respiratory epithelial cell model. Influenza virus encodes for a series of structural and non-structural proteins. Among these viral proteins, the non-structural 1 (NS1) is found to play a key role in pathogenicity. Therefore, viral NS1 mRNA transcript will be prepared using an in-vitro transcription system. The NS1 mRNA obtained from different strains of viruses will be used for direct transfection to H292 cells. Transient transfection will be performed. Then, the temporal pattern and intensity of apoptosis induced by each virus strain will be characterised and compared using Annexin V-FITC staining. Also the induction of cytokines / chemokines will be measured at the transcription and translation levels.

Results: The results showed that transfection of the NS1 mRNA of different subtypes of influenza viruses can induce the cytokines / chemokines production at both transcription and translation levels. The transfection of the NS1 mRNA can also casued apoptosis of host cells at differential level. The effect H5N1 NS1 mRNA transfection was more prominent than the other subtypes.

Ref. No. RFCID: HSI-Lab-3

Ab269
Pathogenesis of avian influenza viruses

PKS Chan[1,3], WY Lam[1], ACM Yeung[1], LCW Chiu[2], JJY Sung[3]
[1]Department of Microbiology, CUHK
[2]Department of Biology, CUHK
[3]Stanley Ho Centre for Emerging Infectious Diseases, CUHK

Avian H5N1 influenza virus causes a remarkably severe disease in humans, with an overall case fatality rate of greater than 50%. Human influenza A viruses induce apoptosis in infected cells, which can lead to organ dysfunction. To verify the role of H5N1-encoded NS1 in inducing apoptosis, the NS1 gene was cloned and expressed in human airway epithelial cells (NCI-H292 cells). The apoptotic events post-transfection were examined by a terminal deoxynucleotidyltransferase-mediated dUTP-biotin nick-end-labelling assay, flow cytometric measurement of propidium iodide (PI), annexin V staining, and Western blot analyses with antibodies specific for pro-apoptotic and anti-apoptotic proteins. We demonstrated that the expression of H5N1 NS1 protein in NCI-H292 cells was sufficient to induce apoptotic cell death. Western blot analyses also showed that there was prominent cleavage of poly(ADP-ribose) polymerase and activation of caspase-3, caspase-7, and caspase-8 during the NS1-induced apoptosis. The results of caspase inhibitor assays further confirmed the involvement of caspase-dependent pathways in the NS1-induced apoptosis. In conclusion, we demonstrated that the NS1 protein encoded by avian influenza A virus H5N1 induced apoptosis in human lung epithelial cells, mainly via the caspase-dependent pathway, which encourages further investigation into the potential for the NS1 protein to be a novel therapeutic target.

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Ab270
A comparative study on host cellular gene transcription response to avian influenza viruses with different pathogenicity

PKS Chan[1], CW Lam[2], KF To[3], WY Lam[1]
[1]Department of Microbiology, CUHK
[2]Department of Chemical Pathology, CUHK
[3]Department of Anatomical and Cellular Pathology, CUHK

Background: Influenza pandemic remains a serious threat to human health. In addition to H5N1, H7 and H9 have occasionally succeeded in crossing the species barrier. The consequence of human infection with avian influenza viruses varies markedly with the subtype. In addition to viral factors, the difference in host cellular response is likely to play a critical role.

Aims: To delineate, characterise and comparing the repertoire of host cellular response to infections with highly pathogenic avian influenza viruses versus low pathogenicity avian influenza viruses and usual human influenza viruses.

Methods: This study used an in-vitro lung cell derived model to examine the post-infection effects on host cell gene expression. The screening results acquired by the broad-catching technique based on microarray assay were subsequently confirmed by gene-specific assays targeted at the transcription and translation levels using real-time PCR and flow-cytometry methods, respectively.

Results: The microarray results indicated that the immune response pathway and the inflammatory pathway were predominantly involved in avian influenza A H5N1 infection. There were differential expression of cytokines/chemokines as well as their receptors in response to human and avian influenza infections. The H5N1 subtype was a more potent inducer of inflammatory cytokines/chemokines and their receptors; particularly TNF-α, CXCL-10/IP-10, CCL-5/RANTES, IL-6, IL-8, CCR-2 and CXCR-5. A higher level of induction on pathogen signalling toll-like receptor (TLR) expression, particularly TLR-3, -7, -8, by the H5N1 subtype was also observed.

Conclusions and implications: Our comparative studies showed that hyper-induction of cytokines/chemokines and toll-like receptor genes could be key cellular mediators contributing to the adverse clinical outcome of infection with highly pathogenic avian influenza viruses. These results provide fundamental information for further identification of novel targets and hence development of new intervention strategies to ameliorate the adverse clinical outcome.

Ref. No. RFCID: 06060112

Ab272
Effect of avian influenza A H5N1 infection on human cellular microRNA profile – identification of gene regulatory pathway leading to adverse clinical outcome

PKS Chan[1], WY Lam[1], KF To[2]
[1]Department of Microbiology, CUHK
[2]Department of Anatomical and Cellular Pathology, CUHK

Background: Avian influenza remains a serious threat to poultry and human health. Recently, a novel system of gene regulation in plant and mammalian cells has been revealed. This system is orchestrated by short RNA molecules (microRNAs) that are differentially expressed according to the physiological and pathological status of the cells concerned. Viruses can interact with the miRNA-mediated gene regulatory pathways. Therefore, the profile of host cell miRNAs may change as a consequence of avian influenza viral infection.

Aims: This study aims at elucidating how avian influenza infection perturbs the human gene regulatory pathways leading to adverse pathological events, e.g. cytokine storm. The ultimate goal is to generate essential information for further studies to identify novel intervention targets to ameliorate the outcome of infection.

Methods: The human lung cell-derived H292 cell line will be used to establish an in-vitro system for influenza infection. H5N1-infected cells will be screened for the expression profile of miRNAs using a highly sensitivity, broad-catching approach, i.e. microarray. Similar data will be obtained from H1N1-infected cells for comparative analysis to identify miRNAs that are differentially up/down-regulated following H5N1 infection. These differentially expressed miRNAs will be further characterised by a combination of in-vitro and in-silico approaches to predict its function and potential as a target for intervention.

Conclusions: Based on the broad-catching miRNA microarray results, we found that dysregulation of miRNA expression are mainly observed in highly pathogenic avian influenza infection. A list of differentially expressed miRNAs was identified for subtypes H1N1 and H5N1, and the temporal pattern of expression was delineated. Among the listed profiles of differentially regulated miRNA, it was found that hsa-miR-1246, hsa-miR663 and hsa-miR-574-3p were highly up-regulated (> 3-fold) in infection with subtype H5 as compared with infection with subtype H1. Also, hsa-miR-100*, hsa-miR-21*, hsa-miR-141, hsa-miR-1274a and hsa-miR1274b were found to be highly down-regulated (> 3-fold) in infection with subtype H5, particularly during the late phase post-infection as compared with infection with subtype H1.

Ref. No. RFCID: 08070022

Ab273
Bismuth complexes as inhibitors of the SARS-coronavirus: targeting the SARS NTPase/helicase

N Yang[1], JA Tanner[2], RM Watt[3], JD Huang[2], H Sun[1],
[1]Department of Chemistry, HKU
[2]Department of Biochemistry, HKU
[3]Faculty of Dentistry, HKU

As one of the widely used elements in clinic for centuries, the application of bismuth-based drugs was extended in medical and health care, e.g., as anticancer, antimicrobial, and antiviral agents. The low toxicity and high effectiveness in the treatment of microbial infections confer bismuth a virtue to treat other infectious diseases. SARS is a type of serious pneumonia which killed hundreds of people world wide when it broke out in 2003. SARS has been shown to be caused by the SARS-coronavirus (SCV). The main proteinase, cysteine proteinases, NTPase/helicase and RNA polymerase of SCV have been identified as potential anti-viral targets, and have already undergone preliminary characterisation. Our research found that bismuth complexes exhibit effective inhibition to SCV helicase both ATPase and duplex-unwinding activities, probably due to the binding of Bi^{3+} to the metal binding domain, a cysteine-rich and Zn^{2+}-bound region in the N-terminus of the helicase. Our cell culture experiments also show the inhibition of Bi^{3+} to SCV, revealing that Bi^{3+} plays the inhibitory role during later stages of virus replicative cycle.

Ref. No. RFCID: 01030182

Ab277
Human microRNA profiling in Mycobacterium tuberculosis infections: Potential association with strain virulence and host predisposition.

ETY Leung[1], Z Lin[1], KF To[2], N Lee[3], EWC. Chan[1], RCC Chan[1], M Ip[1]
[1]Department of Microbiology, CUHK
[2]Department of Anatomical & Cellular Pathology, CUHK
[3]Department of Medicine and Therapeutics, Prince of Wales Hospital.

Background: Recognition and phagocytosis of *Mycobacterium tuberculosis* (MTB) by human macrophages is a key event that leads to activation of immune responses upon infection. Recent studies suggested that bacterial components such as peptidoglycan present in cell walls of microbes including MTB can upregulate microRNAs in macrophages. MicroRNAs are endogenous short RNAs(19-23 nucleotides) molecules involved in post-transcriptional gene repression. The role of microRNAs as negative regulators in human immunity is increasingly arousing scientific attention worldwide.

Hypothesis: Since the MTB cell wall contains a number of specific surface markers and TLR ligands, including lipoproteins, peptidoglycan, lipids, and LAM, we hypothesise that MTB infection in macrophages can lead to upregulation of a group of microRNAs, resulting in attenuation of human immune response so as to favor MTB virulence and intracellular survival. Furthermore, microRNA profiles induced could be strain-dependent and host-dependent, which may partially explain the virulence difference among MTB strains and host predisposition factors.

Methods: This study employs a new commercial qPCR array sets that covers over 500 human microRNAs, to generate and compare macrophage microRNA profiles from different MTB strains and human individuals in order to investigate the roles of microRNA in both strain virulence and host predisposition.

Outcome & Importance: The study is in optimisation stage. Knowledge generated from this proposed study will have a wide range of implications and applications. The resulting microRNA-profiles database will enhance our understanding of MTB and human immunity, substantiate potential strain-dependence and host-dependence on the outcome of infection, and aids future drug design.

RFCID: 09080392

Improving Health and Recognising Excellence

Ab09
Computed tomography angiography and venography in place of catheter angiography for acute spontaneous non-hypertensive intracerebral haemorrhage

GKC Wong for the CTAV intracrebral haemorrhage study investigators
Department of Surgery, PWH, CUHK

Background: In haemorrhagic stroke patients without pre-existing hypertension or aged below 45 years, catheter angiography or digital subtraction angiography (DSA) remained the gold standard for investigation of any underlying vascular lesion.

Aims: With the technology of multi-slice computed tomography (MDCT), we explored the effectiveness of using computed tomographic angiography and venography (CTAV) in place of DSA in patients with spontaneous acute intracerebral haemorrhage.

Methods: In a regional neurosurgical centre in Hong Kong, we prospectively recruited patients (n=109) with non-hypertensive spontaneous intracerebral haemorrhage for this comparative study. All patients had CTAV in a single procedure using a MDCT with 64 detectors. They would then schedule to have catheter angiography the next day. Positive and negative predictive values in detecting vascular lesions causing the intracerebral haemorrhage.

Results: Vascular pathologies causing haemorrhage were identified in 37 (33%) patients, which included cerebral arteriovenous malformation in 22 patients. The positive predictive value and negative predictive value of CTAV for vascular pathologies causing haemorrhage were 97.3% and 100%, respectively.

Conclusions: CTAV was able to screen vascular lesions causing spontaneous acute intracerebral haemorrhage with high positive and negative predictive values.

Implications: CTAV could replace DSA as the initial vascular investigation for patients presented with spontaneous nonhypertensive intracerebral haemorrhage during the acute phase.

Ab16
High-dose simvastatin for aneurysmal subarachnoid haemorrhage: is it better?

GKC Wong, WS Poon, DYW Siu, CWK Lam, MTV Chan, T Gin,
BCY Zee, SW Lam
Department of Surgery, PWH, CUHK

Background: Given the safety profile and benefit of simvastatin in intervening delayed ischaemic deficits (DIDs) after aneurysmal subarachnoid haemorrhage (SAH) and improving cerebral blood flow (CBF), there is no clinical data to compare the efficacy of different dosage regimens (namely whether high-dose regimen is better) and related cost-effectiveness analysis.

Aims: We hypothesised that daily simvastatin 80mg (high dose) treatment given within 96 hours of the ictus over three weeks will reduce incidence and duration of delayed ischemic deficits following subarachnoid haemorrhage when compared to daily simvastatin 40mg (normal dose) treatment, leading to improvement in clinical outcome, which translates into advantage in terms of cost-effectiveness.

Methods: In 4 neurosurgical centres in Hong Kong, we recruited patients (n=240) with spontaneous aneurysmal subarachnoid haemorrhage, aged between 18-75, and the initiation of trial medication from the time of the presenting ictus does not exceed 96 hours for a randomised controlled double-blinded clinical trial. Each patient is randomised to receive simvastatin 80mg (two tablets of simvastatin 40mg) per day or simvastatin 40mg (two tablets of simvastatin 20mg) per day, for 21 days. Plasma creatinine phosphokinase (CPK), alanine aminotransferase (ALT) and cholesterol levels are monitored every 7 days. Study drug will be stopped if ALT is more than 3-fold normal (>180U/L) or CPK>1,000U/L. Presence of delayed ischaemic deficits (DIDs) - 2 or more points fall in modified Glasgow Coma Scale or new focal neurological deficit lasting more than 2 hours - were the

primary outcome measures. Modified Rankin Disability Score (mRS) at six month (favourable if 0-2) and cost-effective analysis in terms of overall direct cost per patient and incremental cost-effectiveness ratio (ICER) of the high dose versus normal dose group were the secondary outcome measures.

Ab28
Stroke incidence and mortality trends in Hong Kong: implications for public health education efforts and health resource utilisation

J Woo[1], CS Ho[1], W Goggins[1], PH Chau[2], YK Tse[1], SV Lo[3]
[1]CUHK
[2]HKU
[3]HA

Background: Cerebrovascular disease (stroke) is the second commonest cause of death and disease burden for those aged ≥ 60 years worldwide. In Hong Kong, it is one of the top three causes of hospital admissions, accounting for the largest number of bed days, need for long term residential care, representing a considerable disease and disability burden. It is uncertain whether there is a parallel change in stroke incidence and case fatality.

Aims: To provide information for predicting the health and social care resource required for stroke in future years, by:
1) reviewing the recent trends in stroke morbidity and mortality by age group and gender;
2) examining temporal changes in morbidity and mortality;

Methods: This is a retrospective study using the Clinical Management System (CMS) of all the hospitals of the Hospital Authority from 1999-2007. Data on stroke occurrence and case fatality according to ICD codes 430-8 covering all strokes were extracted. Poisson and negative binomial regression models were used to estimate relative risks (RRs), 95% confidence intervals and p-values for comparisons between genders and calendar year while controlling for age.

Results: Between 1999 and 2007, a total of 166,355 episodes (118,414 new strokes, 33,736 recurrent strokes and 14,205 old strokes) were identified among the inhabitants aged 35 years and over. Incidence rates for both males and females rose sharply with each decade of age in all individual calendar years. Age-specific rates of males were higher than those of females over the study period except aged ≥ 85 in 2002, 2003 and 2005 for new strokes; aged 35-44 in 1999 and 2002; aged 75-84 in 1999 and 2000; and aged ≥ 85 in 1999 and 2005 for old strokes. The incidence rates of new stroke steadily decreased from 1999 to 2007 in both genders with an exception in 2004 for men. The age-adjusted rates ranged from 526.4 per 100,000 persons amongst male patients in 1999 to 353.5 in 2007 and from 440.1 per 100,000 persons amongst female patients in 1999 to 279.4 in 2007. Case fatality rates were higher among patients aged 75 years and older in both sexes. Age-standardised case fatality rates of strokes of female patients were slightly higher than those of male patients throughout the entire 9-year period, the 30 day rate being 11% in men and 13% in women; at 90 days 14% in men and 16% in women; at 365 days 21% in men and 23% in women. A decline in case fatality rate for stroke was seen only from 1999 to 2001 but not thereafter.

Conclusions: Health promotion efforts, possibly improving socioeconomic circumstances, and improving hospital treatment may have resulted in a decline in both age-standardised stroke incidence rates and case fatality rates between 1999 and 2007, the latter decline being less steep.

Implications: The higher incidence in men compared with women showed that there is room for improvement in primary prevention in men. Declining incidence may not necessarily translate into a reduction in demand for rehabilitation and long term care services, as a result of increasingly larger numbers of elderly people due to population ageing as well as a trend towards decline in case fatality rates.

Ab41
Longitudinal analysis of quality of life for stroke survivors using latent curve models

T Kwok[1], JH Pan[2], XY Song[2], SY Lee[2]
[1]Department of Medicine & Therapeutics, PWH, CUHK
[2]Department of Statistics, CUHK

Background: For the stroke survivors, activities of daily living (ADL), handicap, and depression have significant impact on health-related quality of life (HRQOL). How the dynamic changes of these variables relate to HRQOL over time in the sub-acute phase of stroke recovery has not been investigated.

Aims: To study longitudinal behaviors of HRQOL of the stroke survivors in relation to the changes in ADL, handicap and depression after stroke.

Methods: This was a prospective cohort study of first disabling stroke patients. Subjects were interviewed at three, six, and twelve months after stroke for modified Barthel Index (MBI), London handicap scale (LHS), geriatric depression scale (GDS), and WHO QOL questionnaire (abbreviated Hong Kong version). A latent curve model (LCM) was developed to analyse how the dynamic changes in ADL, handicap, and depressive mood related the changes in HRQOL.

Results: 247 out of 303 patients (82%) followed up at three months after stroke could complete QOL questionnaire. Their mean age was 68.8 years. The LCM analysis revealed that initial physical health HRQOL was independently associated with ADL, handicap, and depression. The other three HRQOL domains scores were primarily associated with depression only. The rates of change in all four domains of HRQOL were significantly and inversely associated with rate of change in GDS only.

Conclusions: Change in mood in the post acute phase of stroke recovery is the most significant determinant of change in HRQOL. More attention should be paid to the detection and management of post stroke depression.

Ab69
Amyloid burden in post-stroke dementia

J Yang, EYL Leung, S Chen, A Wong, P Kwan, YY Xiong, KS Wong, V Mok
Division of Neurology, Department of Medicine and Therapeutics, PWH, CUHK

Background: Pathology studies suggested that Alzheimer's pathology (e.g. amyloid plaques) commonly co-exists with vascular lesion in dementia patients. However, diagnosing concurrent Alzheimer's Disease (AD) in vivo using conventional methods in PSD patient is difficult. We studied the frequency of concurrent AD in PSD patients using Pittsburgh Compound B (PIB) positron emission tomography (PET).

Methods: We performed PIB PET among consecutive PSD patients admitted to our acute stroke unit. We quantified amyloid burden using the global PIB retention standardised uptake value (SUV). We compared the frequency of amyloid burden between PSD patients and healthy controls.

Results: Fifteen PSD patients (mean age 78.9 years [SD, 5.8]) were compared with 18 healthy controls (mean age 65.8 years [SD, 7.4]). We detected AD-like PIB binding in 6 PSD patients (40%) and 1 healthy control (5.5%, χ^2=5.8, P=0.016). The global PIB retention SUV at 35-45 min for all stroke patients was 1.45(SD, 0.23), which was significantly higher than healthy controls (1.27, 0.07, P=0.000). The global PIB retention SUV was higher in PIB positive patients (1.72, SD 0.09) compared with PIB negative patients (1.27, SD 0.03, P=0.042). The results remained unchanged after adjusted for age.

Conclusions: Concurrent Alzheimer's pathology occurs in 40% of patients with PSD. On-going longitudinal study is evaluating whether cognition will decline faster in PIB positive over PIB negative PSD patients. Whether specific treatment targeting amyloid plaques will slow cognitive decline in PIB positive patients requires further study to investigate.

Ab151
Can botulinum toxin decrease carer burden in long-term care residents with upper limb spasticity? An interim analysis of a randomised controlled study

K Lam[1], KK Lau[2], CK Tam[3], KM Yeung[2], KK So[2], YM Wu[4], KY Lam[5], G Cheung[4], S Yui[1], C Leung[1], KS Liang[6], K Tam[4]
[1]SH
[2]Department of Medicine and Geriatrics, PMH
[3]Department of Rehabilitation & Extended Care, TWGH
[4]Department of Medicine and Geriatrics, HHH
[5]Department of Medicine and Geriatrics, KWH
[6]Department of Medicine and Geriatrics, SH

Aims: To evaluate whether botulinum toxin can decrease the burden for carers of infirmary patients with severe upper limb spasticity.

Methods: Long-term care patients with significant upper limb spasticity were recruited from a 250-bed long-term care hospital, the infirmary units of 3 regional hospitals, and 2 regional geriatric community outreach team. Patients were randomised into two groups to receive either intramuscular botulinum toxin A or saline. All patients will receive concurrent standardised physical therapy and occupational therapy programmes. The primary outcome is carer burden. Secondary outcomes include goal attainment, spasticity, resting angular positions of the elbow and wrist joints, passive range of movement for shoulder abduction, elbow extension, and wrist extension; and position of the fingers at rest and at maximal passive finger extension and pain.

Results: In this interim analysis, 29 patients (mean age = 69, SD =20) were recruited. There were 17 patients in treatment group versus 12 patients in control group. Patients were followed up for 13 weeks. There was a significant decrease in the carer burden at six weeks post-injection, improvement in resting position (-1.71 P=0.05) the 3 joints (shoulder, elbow and fingers), resting angle of elbow. In 2 patients the improvement of resting angle of the elbow had contributed to healing of skin breakdown in the flexural area. The improvements persisted but gradually diminished in magnitude until week 12. During the 13-week follow-up, no patients developed new osteoporotic fractures or pressure ulcers in the affected limbs.

Conclusions: Botulinum toxin can improve carer burden scale in the old frail infirmary patients with moderate to severe limb spasticity. It is safe in this group of frail infirmary patients with one dose injection at 1,000 unit's dysport. Pain level of patients during basic care procedures was not improved after botulinum toxin injection. This might be caused by random errors due to small sample size or other confounding factors for PAINAD scale during basic care procedures.

Implications: Chronic spasticity is a common problem for long-term care residents and has caused significant morbidity and mortality. Up to now there is a paucity of research regarding successful treatment of limb spasticity in this group of patients.

Improving Health and Recognising Excellence

Ab21
Evaluation of the pharmacological activities of health supplements derived from Chinese medicine in the amelioration of symptoms of allergic asthma

GGL Yue[1], BCL Chan[1], MH To[1], HF Kwok[1], EKL Hon[2], KP Fung[1,3], CBS Lau[1], PC Leung[1]
[1]Institute of Chinese Medicine, CUHK
[2]Department of Paediatrics, CUHK
[3]School of Biomedical Sciences, CUHK

Background: The incidence of diagnosed respiratory tract disorders is growing in Hong Kong. These include asthma, chronic bronchitis and chronic obstructive pulmonary disease, which are the major cause of hospitalisations for chronic diseases (asthma in children and chronic bronchitis in the elderly). The use of health supplements derived from traditional Chinese medicines (TCM) as complementary treatment has increased substantially in Hong Kong. People use the health supplements as self-medication for the prevention and the relief of symptoms of respiratory tract disorders. Among the most commonly used TCM for treating respiratory tract disorders, 12 TCM have been selected for in vitro pharmacological activities evaluation, including anti-tussive, anti-inflammatory and immunomodulatory aspects. Such TCM are the components of two formulae, which have been shown to improve acute cough symptoms and possess in vitro anti-allergic activities in our previous studies. Among the extracts tested, the extracts of Rhizoma Cynanchi Stauntonii (白前) and Radix Glycyrrhizae (甘草) showed potent attenuation on the acetylcholine- and carbachol-induced contractions in rat tracheal tissues (n=6-8). For the in vitro anti-inflammation assay, extracts of Herba Schizonepetae (荊芥) and Radix Glycyrrhizae (甘草) showed inhibitory effects on LPS-induced nitric oxide production but no cytotoxic effects on the mouse macrophage RAW264.1 cells (n=4-6).

Aims: The effects of the TCM extracts on human peripheral blood mononuclear cells (PBMCs) proliferation and cytokine production were evaluated by [methyl-3H]-thymidine incorporation assay and ELISA, respectively.

Methods: Following the screening studies, the most potent extracts in each assay will be combined and the effects on the amelioration of symptoms of allergic asthma in mouse model will be examined. The synergism between the new TCM combination and conventional drugs (e.g. corticosteroid) in the animal model will be studied.

Results: The extracts of Radix Scutellariae (黃芩) and Radix Glycyrrhizae (甘草) showed significant inhibitory effects on phytohaemagglutinin-induced proliferation without cytotoxicity in PBMC (n=8-12). These extracts also showed inhibitory effects on TNF-α, IFN-γ and IL-2 production in concentration-dependent manner.

Conclusions and implications: The information obtained from this study will give us a better understanding of the mechanism of action of TCM in ameliorating the symptoms of respiratory tract disorders. This may further enhance the understanding of the therapeutic mechanisms of the tested TCM, which may lead to clinical applications. The interaction between the TCM extracts and conventional drugs will also be explored. If positive interaction is observed in this study, the adjuvant effects of herbal medicine on treatment of allergic asthma will be revealed.

Ab22
Study of the efficacy of antifungal traditional Chinese medicine and their active components on the treatment of tinea pedis

KM Lau[1], LH Fu[2], YL Wong[1], CP Lau[1], CW Wong[1], L Cheng[1], CBS Lau[1], VEC Ooi[1], PKS Chan[2], KP Fung[1,3], M Hui[2], PC Leung[1]
[1]Institute of Chinese Medicine, CUHK
[2]Department of Microbiology, CUHK
[3]School of Biomedical Sciences, CUHK

Background: Tinea pedis (also called athlete's foot) is a common dermatophyte infection, affecting 20% people in Hong Kong. Owing to inadequate spectrum of activity, recurrences, drug resistance, toxicities, and drug-drug interactions of antifungal pharmaceuticals, searching for effective alternative medicine is still of great interest.

Methods: In this study, eleven kinds of traditional Chinese medicines (TCM) were selected for in vitro antifungal assay. Based on minimum inhibitory concentration (MIC) values, the ethanolic extracts of Fructus Psoraleae, Rhizoma Curcumae Longae and Folium Eucalypti Globuli were found to possess the most promising antifungal activities against *Trichophyton mentagrophytes* and *Trichophyton rubum*. These three crude extracts were then subjected to solvent partition to yield fifteen fractions. Among them, n-hexane and dichloromethane fractions of Fructus Psoraleae and n-hexane fraction of Folium Eucalypti Globuli exhibited the most potent inhibitory effect against dermatophytes. By activity-guided purification, two active antifungal compounds were isolated from Fructus Psoraleae and Folium Eucalypti Globuli.

Results: The tinea pedis-treating effects of ethanolic extracts of Fructus Psoraleae, Rhizoma Curcumae Longae and Folium Eucalypti Globuli, as well as their active fractions were further investigated using a guinea pig model. Topical application of the crude extracts or fractions to the infected guinea pig feet was capable of alleviating tinea pedis. However, statistical significance was not achieved when compared with the control. On the other hand, when the three ethanolic extracts were used as a compound herbal formula, it could significantly reduce the fungal burden to 2.5 ± 1.8 vs 8.0 ± 2.9 in control group (p<0.01).

Conclusions: The results of this study shed lights to the development of topical antifungal agents using Chinese herbs or their active fractions.

Ab29
A pilot project to evaluate the effects of auriculotherapy in relieving symptoms of constipation and improving quality of life in elderly residential care home residents

MK Li[1], DTF Lee[2], LKP Suen[2]
[1]School of Science and Technology, OUHK
[2]The Nethersole School of Nursing, CUHK

Background: Constipation is a common, but poorly managed health problem among elderly residential care home (RCH) residents in Hong Kong. It impairs the general health and quality of life (QoL) of elderly people. Studies have reported auriculotherapy (AT) to be effective in managing constipation in China; however, significant methodological flaws were identified in these studies.

Aims: This pilot project aims to provide local preliminary information on the effects of AT in relieving symptoms of constipation and promoting QoL among elderly RCH residents.

Methods: A randomised placebo-controlled trial design was adopted. The elderly RCH residents were recruited and then randomly assigned to one of the two study groups. The intervention was to administer AT with magnetic pellets (experimental group) or Semen Vaccariae (placebo-controlled group) onto selected auricular acupoints for three weeks. Constipation symptoms and QoL were measured by the Patient Assessment of Constipation – Symptom Questionnaire and the Patient Assessment of Constipation – Quality of Life Questionnaire, respectively, before intervention, on Day 10, Day 21, and then one-month follow-up.

Results: Forty-two participants were recruited in this study. Thirty-nine of them (experimental group=21; placebo-controlled group=18) received the assigned intervention. Results revealed statistically significant time effects in symptom scores and QoL scores (p<.05), but insignificant group effects and interaction effects. Descriptive data suggested that symptoms of constipation and QoL were better improved in participants of the experimental group at the end of intervention.

Conclusions and implications: The pilot project provides local preliminary information on the effects of AT in managing constipation in Hong Kong and the respective study methodology for future studies. Although the effects of AT between groups were not statistically significant, descriptive data suggest that participants who received AT with magnetic pellets experienced better and more beneficial effects. The ultimate aim is to promote the general health of elderly people who are suffering from constipation.

TCM

Ab48
A randomised controlled trial of Chinese herbal medicine in the treatment of functional constipation

CW Cheng[1], ZX Bian[1], LX Zhu[2]
[1]School of Chinese Medicine, HKBU
[2]Statistics Research and Consultancy Center, HKBU

Background: Functional constipation (FC) is a common, with estimated prevalence of over 10% in developed countries. Many patients are disappointed in current conventional treatment and, therefore, Chinese herbal medicine (CHM) becomes a popular alternative choice.

Aims: To determine the efficacy and safety of a Chinese ancient formula, MaZiRenWan (MZRW) for the treatment of FC.

Methods: This was a prospective, randomised, double-blind study. After 2-week run-in, FC patients (Rome III criteria) in Excessive Syndromes defined by traditional Chinese medicine theory were randomised to receive an 8-week MZRW (7.5g, bid) or placebo treatment, and then an 8-week follow-up period. The dose selected was first determined in a separated clinical study. The primary end point was the responder rate for complete spontaneous bowel movement (CSBM) during treatment. Participants with a mean increase of CSBM $\geq$ 1/week compared with their baseline were defined as responders. Secondary outcome measures included response rate during follow-up, individual and global symptoms assessment, and reported adverse effects.

Results: One hundred and twenty subjects were randomised (60 per arms). Responder rates for the MZRW group and placebo group were 43.3% and 8.3% during treatment, and 46.7% and 21.7% in the follow-up period, respectively (p<0.05). MZRW benefited on the increase of CSBM, relief the severity of constipation, straining of evacuation, and effectively reduced the use of rescue therapy when comparing with placebo during treatment. No serious adverse effect was reported.

Conclusions: MZRW is safe and effective for alleviating FC by comparing with placebo.

Implications: MZRW (7.5g, bid) is beneficial and safe for the FC patients in Excessive Syndrome, which can potentially be developed into one of standard treatment in clinical practice. Besides, the novel study design of first having a dose determination study and then a placebo-control clinical trial can be a reference for other CHM studies in the future.

Ref. No. HHSRF: 05060161

Ab61
Antifungal activity of compound #205 and its acyl-derivatives against Candida species

PWK Tsang
Oral BioSciences, Faculty of Dentistry, HKU

Background: Candidiasis is one of the most commonly encountered human fungal infections and is caused by *Candida* species, most notably *C. albicans*. The opportunistic fungal pathogen exists as part of the normal microbiota, but can become invasive in immunocompromised patients with AIDS, cancers or organ transplantation. Superficial candidiasis is common but disseminated infections are usually fatal. Antifungal treatments include flucytosine, polyenes, azoles and echinocandins. Unfortunately, they may have toxic side effects, limited spectrum of activity and poor absorption. Alarmingly, extensive use of antifungal agents has resulted in the emergence of resistant *Candida* infections in clinical settings. There is thus an urgent need for new antifungal agents.

Methods: Using broth dilution assay, we identified a compound (#205; 5,6,7-trihydroxy-2-phenylchromen-4-one) from a natural compound library (n = 400) with potent anti-Candidal activity against a clinical strain *C. albicans* CA12. Compound #205, also known as baicalein, is a major component of a Chinese herbal medicine *Scutellaria baicalensis*. In the present study, focused libraries of compound #205 were generated via acylation and the anti-Candidal activity was evaluated by broth dilution assay in accordance with the CLSI guidelines. Rhodamine 6G assay was used to evaluate the effects on membrane fluidity and efflux pumps.

Results: Focused libraries (L1-L4) of compound #205 were generated. Besides C. albicans, broth dilution assay showed that both compound #205 and L1 exhibited similar antifungal activity against non-*albicans*

Candida (NAC) species. Lower anti-Candidal activity was observed in L2-L4, in connection with the size of the carbon chain of the acyl donors. Compound #205 and L1 were fungistatic and inhibited efflux pump activity in *C. albicans* and NAC species.

Conclusions: The findings of the present study not only revealed the broad antifungal spectrum of compound #205, but also indicated the hydroxyl groups might play a pivotal role in anti-Candidal potency. Our data provided new information for structure-activity relationship and antifungal spectrum of compound #205, which might help in further structural modifications to generate compounds with improved therapeutic potency.

Ref. No. RFCID: 08070142

Ab66
Effects of *Sophora flavescens* on the pharmacokinetics of indinavir: an in vitro study of cytochrome P450 3A4 inhibition

JM Yang[1], PSP Ip[1], YF Xian[1], M Zhao[1], RCY Chan[2], SS Lee[2,3], CT Che[1]
[1]School of Chinese Medicine, CUHK
[2]Department of Microbiology, CUHK
[3]Stanley Ho Centre for Emerging Infectious Diseases, CUHK

Background: Protease inhibitor (PI)-based regimens have been widely used in the pharmacotherapy of HIV, but the development of many HIV drugs is limited by their poor bioavailability due to cytochrome P450 (CYP) metabolism. Thus, boosted PI regimens combining a primary PI (e.g. lopinavir) and a CYP3A4 inhibitor (e.g. ritonavir) are currently included in standard highly active antiretroviral therapy (HAART) regimens.

Aims: This study was undertaken to explore the potentials of *Sophora flavescens* (Ku-Shen) and its ingredients to boost antiretroviral therapy (indinavir, IDV) by altering drug pharmacokinetics through CYP3A4 inhibition.

Methods: Inhibitory effects of *Sophora* extract (70% ethanol) on human CYP3A4 activity were confirmed in both microsomal incubation systems (human pooled microsome and recombinant CYP3A4) and a fluorometric enzyme inhibition assay. In contrast, the alkaloid components of *S. flavescens,* such as matrine, oxymatrine, sophoridine and sophocarpine, did not show significant inhibitory activity. The inhibitory effects of three fractions obtained from the *Sophora* total extract were further examined. The ethyl acetate (EA) fraction (IC_{50} = 0.93 μg/mL) exhibited significant inhibition on human CYP3A4 activity, followed by the butanol fraction (IC_{50} = 2.62 μg/mL) and water fraction (IC_{50} = 211 μg/mL). HPLC-MS characterisation indicated that the major components of the EA fraction (SEEA) belonged to flavonoid structures, whereas those in the water fraction were alkaloids; the butanol fraction contained both flavonoids and alkaloids. To provide further evidence to support the potential application of *S. flavescens* as a pharamacokinetic enhancer for antiretroviral therapy, we have developed an animal system to measure *in vivo* effect of *S. flavescens* towards IDV pharmacokinetics. The assay system was validated by using ritonavir (RTV, a potent and selective CYP3A4 inhibitor) as a positive control.

Results: The results showed that after a seven-day (twice a day) pre-treatment of RTV (10 mg/kg), the AUC0-t value of IDV was remarkably increased by 2.5-fold, with a reduction of CL value (3.0-fold) and extension of half-life (2.9-fold). The results suggested the feasibility of this animal model to study the in vivo effect of *S. flavescens* on IDV pharmacokinetics.

Ref. No. HHSRF: 07080171

Ab76
Safety studies on commonly used Chinese herbal medicines during pregnancy

L Li[1], LY Tang[1], PC Leung[1], TK Lau[1], CC Wang[1]
[1]Department of Obstetrics & Gynaecology; PWH, CUHK
[2]Institute of Chinese Medicine, PWH, CUHK

Background: Herbal medicines become popular for therapeutic and complementary use during pregnancy in local regions, Asia-Pacific areas and worldwide. No safety information of the use of herbal medicines for general and medical communities is available.

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Aims: The aim of the study was to identify the reproductive toxicity of herbal medicines during pregnancy.

Methods: Firstly, safety data from available literature was reviewed. Cochrane Databases, EMBASE Review, MEDLINE, PubMed, Wiley Inter Science, Chinese Journal Net and WanFang Database were searched. All clinical trials addressing use of herbal medicines in pregnancy were analysed. Over 3,000 literature items were selected. No clinical trials have evaluated the safety of herbal medicines. Adverse pregnancy outcomes were recorded. Maternal dry month, insomnia and palpitations are common. Neonatal mortality, congenital malformation and mental retardation are not significantly high. Minor side-effects developed in commonly used herbal medicines, and potential pathological effects were recognised. Animal originat medicines cause allergic reactions. Peach Seed, Pseudo ginseng Root, Safflower, and Bitter Orange are not recommended and Motherwort should be avoided. Human or animal maternal and perinatal mortality and/or congenital malformation are observed. This systematic basic research is necessary to assess the safety of herbal medicines in their application during pregnancy. Physicians should explicitly elicit and document the history of herbal medications used by pregnant women. Clinicians should be familiar with the potential reproductive effects of the commonly used herbal medicines to prevent and recognise potentially serious problems associated with their use. Secondly, commonly used herbal medicines for pregnancy were selected for toxicity study in animals *in vivo*. Various gestational stages for effects on early pregnancy, embryo-fetal development, and pre- and postnatal growth were examined.

Results: We found that Rhizoma Atractylodis Macrocephalae at higher clinical dose as in human subjects can result in moderate to severe skeleton congenital malformations, including absence of ulnar and sacral regression with congenital hip dysplasia in late gestation in mice and foetal hydrops and short ear in rabbits.

Conclusions: The findings not only provides background information in the concern of use of Chinese herbal medicines in pregnant women in the public health and health service systems, particular data on the benefit and potential toxicity of the Chinese herbal medicines to the mothers' and fetuses' health, but also generates scientific support to ensure that the products of the Chinese herbal medicine satisfy the specific efficacy and safety for promotion and marketing in Hong Kong and worldwide.

Ref. No. HHSRF: 06070511

Ab104
Electroacupuncture for post-operative ileus after laparoscopic colorectal surgery: a randomised sham-controlled study

SSM Ng, WW Leung, CYN Wong, JFY Lee
Division of Colorectal Surgery, Department of Surgery, CUHK

Background: Post-operative ileus remains a significant medical problem after colorectal surgery that adversely influences patients' recovery and prolongs hospital stay. Acupuncture is widely accepted as an effective treatment option for post-operative nausea and vomiting, but its role in treating post-operative ileus is unclear. This study aimed to investigate the efficacy of electroacupuncture in reducing the duration of postoperative ileus and hospital stay after laparoscopic colorectal surgery.

Methods: Consecutive patients undergoing elective laparoscopic resection of colonic and upper rectal cancer without the need of stoma creation or conversion were randomly allocated to one of the three groups receiving either electroacupuncture (EA), sham acupuncture (SA), or no acupuncture (control). The acupoints Zusanli, Sanyinjiao, Hegu, and Zhigou were used. Patients randomised to the EA and SA groups underwent one session of acupuncture daily (15 minutes each) from postoperative day 1 till day 4. The primary outcome was time to defecation. Secondary outcomes included time to resume diet and hospital stay.

Results: Between October 2008 and June 2010, 145 patients (47 EA, 48 SA, 50 control) were recruited. The demographic data were similar between groups. Comparing with the control group, the EA group had significantly shorter time to defaecation (87.6 hours vs. 122.2 hours, $P=0.001$), time to resume normal diet (4.1 days vs. 4.9 days, $P=0.021$), and duration of hospital stay (6.8 days vs. 8.8 days, $P=0.011$). The time to defaecation of the EA group was

also significantly shorter than that of the SA group (87.6 hours vs. 109.1 hours, $P=0.020$). EA was more effective than both control and SA in reducing post-operative pain and analgesic requirement. Stepwise multiple linear regression analysis revealed that absence of complications and EA were independent predictors of shorter duration of post-operative ileus and hospital stay after laparoscopic colorectal surgery.

Conclusions: This study suggests that EA is more effective than no acupuncture and SA in stimulating early return of bowel function and reducing post-operative analgesic requirement. EA is also more effective than no acupuncture in reducing the duration of hospital stay. The use of EA is an independent predictor of shorter duration of post-operative ileus and hospital stay after laparoscopic colorectal surgery.

Implications: This study provides strong evidence supporting the beneficial roles of EA in treating post-operative ileus and shortening hospital stay after laparoscopic colorectal surgery. As laparoscopic colorectal surgery has been shown to have higher direct cost than the open counterpart, a faster post-operative recovery brought about by the use of EA may help reduce the financial burden to the hospital/health care system and improve the cost-effectiveness of the procedure.

Ref. No. HHSRF: 06070371

Ab106
LC-MS determination of aristolochic acids-DNA adducts as biomarkers associated with kidney disease

S Chan, HZ Wu, SH Lin, ZW Cai
Department of Chemistry, HKBU

Aristolochic acids (AAs) is a mixture of structurally related nitrophenanthrene carboxylic acids (mainly AA-I and AA-II) derived from Aristolochia species, which has been used as herbal medicines to treat tumours, snake bites, obstetrics, rheumatism, etc. Recent research, however, has shown that uncontrolled exposure to plant extracts containing AAs have might result in nephropathy in the form of rapidly progressive renal failure and possible cancer of the urinary tract at later stages. Aristolochic acid nephropathy (AAN) has been observed in patients due to the formation DNA-adducts with the exposed AAs through metabolic activation. As a result, the use of herbal medicines containing AA-I and AA-II have been banned in many countries or regions including Hong Kong, USA and Europe. However, AAs are still being found in some slimming drugs and herbal remedies. Results from biomedical studies indicate that AAs are powerful nephrotoxic and carcinogenic agents after forming covalent DNA adducts. Thus, determination of metabolic profiles and characterisation of AA-DNA adducts is essential for investigating the mutagenic and carcinogenic potential of AAs. Our in vitro and *in vivo* metabolism studies of AA indicated that in addition to the demethylation and oxidation, aristolactam was detected as the major metabolites. Extensive phase II metabolism which include sulfation, acetylation and glucuronidation, were also observed for the phase I metabolites of AA-I and AA-II in rat urine. Enzymatic reductive activation of AAs in the presence of DNA led to the formation of covalent adducts, which was found to be the origin of the kidney disease. The DNA adducts were detected in rat studies of AA toxicity and human suffered from CHN. Determination of DNA adducts was used as markers for toxicology study of AAs. The biomarkers for AAs poisoning, namely dA-AAI, dA-AAII, dG-AAI, dG-AAII, dC-AAI and dC-AAII were detected in *in vitro* incubated calf thymus DNA samples with both zinc/H+ and xanthine oxidase as the activating system. They were characterised by high resolution mass spectrometry and MS-MS analysis.

Ref. No. HHSRF: 05060141

Ab196
Attitude and behaviour towards the use of traditional Chinese medicine amongst allopathic physician in Hong Kong

VCH Chung[1], S Hillier[2], CH Lau[1], S Wong[1], EK Yeoh[1], SM Griffiths[1]
[1]School of Public Health and Primary Care, CUHK
[2]Institute of Health Sciences Education, Barts and The London School of Medicine and Dentistry, UK

Background: Recognising the international trend for patients to choose both allopathic western medicine (WM) and traditional, complementary

and alternative medicine (TCAM), the World Health Organization has called for stronger collaboration between WM doctors (WMD) and TCAM practitioners. This resonates with the situation in Hong Kong where the dominant modality of patient care is primarily based on WM practice while traditional Chinese medicine (TCM) is often used as a complement. The roots of this utilisation pattern lie in colonial history when TCM was marginalised during the British administration. However since 1997 when China regained sovereignty, policies to regulate and professionalise TCM practices have been formally introduced. Despite both its popularity and this policy shift, progress on implementing collaboration between WM and TCM clinicians has been slow. This study, the first since 1997, explores current attitudes and referral behaviours of WMD towards use of TCM.

Aims: We hypothesised that WMD would have positive attitudes towards TCM, due to regulation and cultural affinity, but that few actual TCM referrals would be made given the lack of a formal collaboration policy between elements within the healthcare system.

Conclusions: Our results support these hypotheses, and this pattern possibly rooted from structural inhibitions originating from the historical dominance of WM and failure of services to respond to espoused policy. These have shaped Hong Kong's TCAM policy process to be closer with situations in the West, and have clearly differentiated it from integration experiences in other East Asian health systems where recent colonial history is absent. In addition, our results revealed that self use and formal education of TCM, rather than use of evidence in decision making, played a stronger role in determining referral. This implies that effective TCAM policies within WM dominated health systems like Hong Kong would require structural and educational solutions that foster both increased understanding and safe referrals.

Ref. No. HHSRF: 05060521

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Viral hepatitis

Ab04
Does extra-high dose hepatitis B vaccination confer longer serological protection in peritoneal dialysis patients: a randomised controlled trial

KM Chow[1], SHK Lo[2], CC Szeto[2], SK Yuen[3], KS Wong[2], BCH Kwan[2], CB Leung[1], PKT Li[1]
[1]Department of Medicine & Therapeutics, PWH, CUHK
[2]Department of Medicine, PYNEH
[3]Department of Medicine and Geriatrics, CMC

Background: Viral hepatitis B infection remains a major health hazard for end-stage renal disease patients on dialysis, with substantial direct costs and long term impact on patient morbidity and mortality. However, the response to recombinant hepatitis B vaccine remains sub-optimal among dialysis population.

Methods: In this multi-centre randomised controlled trial, we studied the factors that modify the response to intramuscular Engerix-B vaccination in patients on peritoneal dialysis. The primary aim was to study if three-dose schedule of extra-high dose (80 microgram) of Engerix-B would offer better primary seroconversion and more persistent serological protection than the conventional 40 microgram dosing.

Results: Forty-two peritoneal dialysis patients were randomised to receive conventional 40 microgram Engerix-B dose and 45 patients to 80 microgram dose. Seroconversion (hepatitis B surface antibody anti-HBs level $\geq$ 10 IU/l 3 months after completion of the third dose) occurred in 78.6% of patients after 40 microgram Engerix-B dosing treatment, *versus* 62.2% for those receiving 80 microgram Engerix-B treatment (P=0.11). After 12 months, persistence of protective anti-HBs also did not differ between 40 microgram (45.2%) and 80 microgram (51.1%) treatment groups (P=0.67). In contrast, patients with seroconversion three months after the third dose of Engerix-B had a higher normalised protein nitrogen appearance (nPNA) than patients without seroconversion (1.16 $\pm$ 0.25 g/kg/day *versus* 0.96 $\pm$ 0.23 g/kg/day, P=0.001).

Conclusions: We found no evidence of a worthwhile clinical benefit from increasing the three-dose intramuscular Engerix-B vaccine from 40 microgram to 80 microgram dose. An unplanned analysis suggested a role of improved protein intake to improve the immune response to hepatitis B vaccine in peritoneal dialysis patients.

Ref. No. RFCID: 06060072

Ab08
A simple score using hepatitis B virus DNA can predict development of hepatocellular carcinoma in 10 years

HLY Chan[1], VWS Wong[1], F Mo[2], SL Chan[2], TSK Mok,[2]
[1]Department of Medicine and Therapeutics, CUHK
[2]Department of Clinical Oncology, CUHK

Background: Chronic hepatitis B virus (HBV) infection is the most important cause of hepatocellular carcinoma (HCC) in Hong Kong.

Aims: We aimed to investigate the role of HBV DNA in the prediction of HCC.

Methods: A prospective cohort of 1,005 chronic HBV infected patients in a surveillance programme for HCC since 1999 was studied (training cohort). Risk factors including HBV DNA at the initial visit were identified. A prediction score using various risk factors was generated. This score was subsequently validated in another independent prospective cohort of 424 patients followed up since 1997 (validation cohort).

Results: In the training cohort, 105 (10.4%) patients developed HCC at a median follow-up was 9.94 (95% CI 9.86, 10.02) years. On Cox proportional hazard model, high HBV DNA was an independent risk factor for HCC in addition to older age (>50 year old), low serum albumin ($\leq$35 g/l), high serum bilirubin (>18 μmol/l) and liver cirrhosis. The adjusted hazard ratio for HCC of the intermediate HBV DNA stratum (HBV DNA >4–6 log copies/ml) was 1.83 (95% CI 1.03-3.25, p=0.039) and that of the high HBV DNA stratum (HBV DNA >6 log copies/ml) was 3.40 (95% CI 1.97-5.87, p<0.001). A prediction score composed of these 5 factors ranging from 0 to 44.5 was generated. The number of patients who developed HCC was 12

(2.2%) if the score was <5, 41 (14.5%) if the score was 5-19.5, and 52 (29.4%) if the score was $\geq$20 (p<0.0001). By applying the cutoff value of 5, the score excluded future HCC development with high accuracy (negative predictive value 97.8%). In the validation cohort, 45 (10.6%) patients developed HCC in a median follow-up of 10.53 (95% CI 10.43, 10.59) years. 297 (70.0%) patients had prediction score below 5, 63 (14.9%) had score 5 to 19.5, and 64 (15.1%) had score at or above 20. The 5-year and 10-year HCC-free survival were 98.3% and 97.1% in the low-risk category, 90.5% and 71.0% in the medium-risk category (hazard ratio 12.8; 95% CI 5.6, 29.1), and 78.9% and 67.7% in the high-risk category (hazard ratio 14.6; 95% CI 6.3, 33.8), respectively.

Conclusions: A simple scoring system using HBV DNA strata was generated and validated by 2 longitudinal cohorts with long-term follow-up. The risk of HCC development was <3% in 10 years in the low risk category.

Implications: This prediction score can be widely applied to clinical practice as it is composed of easily available clinical parameters. Low risk patients can have the risk score reassessed in 3-5 years while avoiding frequent HCC surveillance by repeated ultrasound and alfa-fetoprotein measurement. As 70% of patients belonged to the low risk category in the validation cohort, the application of this prediction score can facilitate more efficient resource allocation to the higher risk patients in the public health setting.

Ref. No. RFCID: 06060122

Ab26
Quantitative analysis of short hepatitis B virus DNA fragments in plasma for the detection of hepatocellular carcinoma

SW Yeung, AKC Chan, DYM Lo
Department of Chemical Pathology, CUHK

Background: Chronic hepatitis B virus (HBV) infection is an important aetiological factor for hepatocellular carcinoma (HCC) in China. As HBV integration occurs frequently in tumour tissues, the detection of tumour-derived HBV sequences in blood provides a potential non-invasive means for the detection and monitoring of HCC. However, due to the presence of active viral replication, it is difficult to specifically detect tumour-derived HBV DNA in a background of virus-associated HBV DNA. Based on the previous observation that tumour-derived DNA are mainly short fragments of <200 bp, we hypothesised that the size of circulating tumour-derived HBV DNA and HBV DNA associated with intact virions would be different and, hence, the analysis of short HBV fragments in plasma would be clinically useful for the detection of HCC.

Methods: Plasma samples were collected from 50 HCC patients with chronic HBV infection and 38 sex- and age-matched chronic HBV carriers without any evidence of HCC. DNA extracted from each plasma sample was divided into two portions. One portion was subjected to size-fractionation using the PureLink PCR purification kit (Invitrogen) to obtain DNA molecules of size <300bp. The other portion was analysed without size-fractionation. The two portions were then subjected to real-time PCR for the quantitative detection of HBV DNA by targeting the X gene of the HBV genome.

Results: In the portion containing DNA of size <300bp, the median concentrations of HBV DNA were 58,000 copies/mL for the HCC patients and 290 copies/mL for the HBV carriers (P<0.001, Mann-Whitney test). The short HBV DNA was 200-fold higher in the HCC patients compared with HBV carriers. Using receiver operation characteristic (ROC) analysis the area under the curve (AUC) was 0.747 for discrimination the two groups. Without size fractionation, the median HBV DNA concentrations of the HCC patients and HBV carriers were 2,510,000 and 80,000 copies/mL respectively. A 31-fold difference was observed between the concentrations of the two groups. Using ROC analysis, the AUC was 0.692 for discriminating HCC patients and HBV carriers. These results suggest that size fractionation of circulating DNA may be useful for the enrichment of tumour-derived fragmented HBV DNA in the portion containing DNA of size <300bp.

Conclusions: Circulating HBV DNA derived from HCC tumour tissues are shorter than those associated with intact HBV virions. Through size-

fraction of plasma DNA, tumour-derived HBV DNA can be enriched from the plasma of HCC patients. The analysis of short HBV DNA fragments may be clinically useful for the detection and monitoring of HCC.

Ref. No. RFCID: CUHK-BS-017

Ab36
Hepatitis B virus promotes hepatocarcinogenesis by activation of Pak1

I Luk, CY Pang
Department of Anatomy, Faculty of Medicine, HKU

Hepatocellular carcinoma (HCC) is one of the major malignancies in the world. The prognosis of HCC is poor, due to frequent intrahepatic metastasis and tumour recurrence. Hepatitis B virus (HBV) is one of the most important aetiological factors of HCC. P21-activated protein kinase (Pak1), a main downstream effector of small Rho GTPases, Rac1 and Cdc42, plays an important role in the regulation of cell morphogenesis, motility, mitosis and angiogenesis. Recently, we found that Pak1 gene was over-expressed in human HCCs. Over-expression of Pak1 in human HCCs was associated with more aggressive tumour behaviour in terms of more metastatic phenotype and more advanced tumour stages. However, the mechanism by which Pak1 is activated in HCC remains unclear. Our recent data that HBx, an oncoprotein found in HBV genome, may activate Pak1 and promotes HCC cell migration. Here we will present our study on activation of Pak1 by HBx. As HBx is also involved in HBV replication, our study may provide novel insight whether inhibition of Pak1 may help to prevent HBV infection.

Ref. No. RFCID: 09080782

Ab63
The use of serum hepatitis B viral DNA in prognostication of liver cancers undergoing non-surgical therapy

SL Chan[1], FK Mo[1], VW Wong[2], HLY Chan[2], PKS Chan[3], K Wong[1], W Yeo[1]
[1]Department of Clinical Oncology, CUHK
[2]Department of Medicine and Therapeutics, CUHK
[3]Department of Microbiology, CUHK

Background: Hepatitis B viral (HBV) infection is a prevalent infection in Hong Kong, and hepatocellular carcinoma (HCC) is one of the frequent complications of the infection. The impact of viral activity and the role of viral suppression in patients with established advanced HCC are unclear. In current study, we aim to evaluate: 1) the prognostic significance of HBV DNA; 2) the impact of anti-viral therapy prior to HCC diagnosis on the outcome of HBV-related HCC.

Methods: A prospectively collected cohort of patients with confirmed diagnosis of inoperable HBV-related HCC was consented from the period of 2005-07. The serum HBV DNA level was measured by Taqman real-time polymerase chain reaction assay with detection range of 102-109 copies/mL. Clinical factors including demographics (Age, sex), liver functions (Bilirubin, albumin, prothrombin time, ALT, ALP), clinical factors (Performance status, ascites, Child's staging, use of anti-viral therapy) and tumorous features (tumour staging, vascular invasion, alpha-fetoprotein) at baseline were determined. Overall survival was defined as time from first date of presentation to the date of death or loss to follow-up. Univariate analyses followed by multivariate analyses were conducted to evaluate the prognostic significance of HBV DNA and the impact of anti-viral therapy on the outcome of HCC.

Results: A total of 150 pts were recruited. Median age was 60 years (Range: 18-86), and 135 (90.0%) were male. Median follow-up time was 15.0 months (11.8-18.2 months). 44 (29.3%) had cirrhosis. 8 received loco-ablative therapy, total 79 received palliative therapy (49 trans-arterial and 30 systemic therapy) and 63 were put on best supportive care. The median overall survival was 7.8 months (95% C.I. 5.3-9.3 months). The medium serum HBV DNA level was 1.31×10^6 copies/mL (Range: 102-1.1×10^9 copies/mL). Serum HBV DNA at diagnosis of HCC was not prognostic of overall survival in both univariate and multivariate analyses. 85 patients were put on anti-viral therapy at the time of diagnosis of HCC. The use of anti-viral therapy was associated with improved overall survival (20.9 vs. 4.4 months HR=0.22; 95% C.I. 0.12–0.40; p<0.0001). The use of anti-viral therapy remains to be an independent prognostic factor (HR=0.17; p<0.0001) after adjustment with all factors as listed above. Exploratory analysis showed that patients with anti-viral therapy had better liver function and higher chance of treatment for HCC.

Conclusions: Serum HBV DNA level has not been shown to be of prognostic value in the present patient population with inoperable HBV-related HCC. The potential adverse effect of viral load on HCC prognosis is possibly compensated by the use of anti-viral therapy, which is shown to be prognostically significant, and is related to improvement in non-tumorous liver function. This study provides evidence that viral suppression is of potential clinical value in improvement of outcome in advanced HBV-related HCC. Prospective clinical trials are warranted.

Ref. No. RFCID: 09080422

Ab71
Health-related quality of life and health preference of patients with chronic hepatitis B infections

CLK Lam[1], ETP Lam[1], CL Lai[2], MF Yuen[2], DYT Fong[3], SM McGhee[4], GM Leung[4]
[1]Family Medicine Unit, HKU
[2]Department of Medicine, HKU
[3]Department of Nursing Studies, HKU
[4]School of Public Health, HKU

Background: About 400 million people are chronic hepatitis B (CHB) carriers. CHB can affect health-related quality of life (HRQOL) but data is lacking. Several anti-viral drugs are available but there is some uncertainty on whether and which treatment is cost-effective for CHB patients.

Aims: To evaluate the HRQOL and health preference of CHB patients at different stages of illness, and to determine the cost-effectiveness of anti-viral treatments in preventing the progression of disease from CHB to liver-related complications.

Methods: 589 Chinese adult CHB patients were interviewed with a structured questionnaire, the SF-36 Health Survey version 2 (SF-36v2), and the Chronic Liver Disease Questionnaire (CLDQ). The differences in HRQOL and health preference scores were compared by t-test and one-way analysis of variance. Multiple linear regression was used to identify any factors affecting HRQOL. Cost-effective analysis by Markov modelling was carried out on five anti-viral treatment options: 1) no treatment; 2) lamivudine (LVD); 3) adefovir (ADV); 4) entecavir (ETV); and 5) adding ADV to LVD when LVD-resistance developed.

Results: CHB patients had significantly lower HRQOL scores than the population norm, even for those without any complications and with normal liver function. There was a progressive drop in health preference values from 0.75 in asymptomatic carriers to 0.72 in patients with hepatocellular carcinoma (HCC) and 0.70 in patients with cirrhosis. Complications such as cirrhosis or HCC, higher level of liver biomarkers, psychological co-morbidity, younger age and female were important determinant of HRQOL. The incremental cost-effective ratios of all tested anti-viral drugs were below National Institute for Health and Clinical Excellence (NICE) threshold of GBP 20,000. LVD was the most cost-effective treatment compared with no treatment, with an incremental cost of HKD 123,336 per quality adjusted life year (QALY). The cost per QALY of ETV treatment was HKD 219,286.

Conclusions: CHB infection had a negative impact on HRQOL. LVD was the most cost-effective treatment for Chinese patients with CHB infection, but ETV should be preferred because it can save more QALYs.

Implications: This finding provided evidence that anti-viral treatments for CHB patients in Hong Kong is cost-effective in improving quality of life and survival by preventing the progression of disease.

Ref. No. HHSRF: 05060741

Ab127
G1613A mutation on HBV core promoter suppresses e antigen secretion and enhances viral replication

MS Li[1], PKS Chan[1], CH Wong[1], PKS Ng[1], JJY Sung[2], HLY Chan[2], SKW Tsui[1,3,*]
[1]School of Biomedical Sciences, CUHK
[2]Department of Medicine and Therapeutics, CUHK
[3]Centre for Microbial Genomics and Proteomics, CUHK

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This study presents a follow-up investigation of a previous case control study which aimed to identify genomic markers in hepatitis B virus (HBV) associated with hepatocellular carcinoma (HCC) [Sung et al. J Virol 2008;82:3604-11]. Our results showed that one of those markers, the G-to-A mutation at nucleotide 1613 (G1613A), can significantly increase the core promoter activity and the effect was reversible by the A-to-G back mutation. Moreover, the effect was genotype-dependent with the promoter activity higher in genotype C than in genotype B. In a study recruiting 255 chronic HBV carriers with subgenotype Cs suggested that the mutation was associated with serum HBV DNA level higher than 6 log copies/ml in female. Furthermore, *in vitro* full-length genome study of the mutation showed that the mutation decreased the extracellular HBeAg level significantly by 86-90%, while no significant change on the level of surface antigen (HBsAg). Real-time quantitative polymerase chain reaction showed that the mutation significantly increased the level of extracellular HBV DNA by 2-4 folds. Taken together, our results suggest that the G1613A mutation suppresses the HBeAg production and enhances virus production.

Ref. No. RFCID: 09080302

Ab131
C-terminal truncated HBV X protein plays key role in hepatocarcinogenesis

NF Ma, SH Lau, L Hu, D Xie, Y Wang, XY Guan
Department of Clinical Oncology, HKU

Background: X protein (HBx), a product of hepatitis B virus (HBV), has been closely associated with the development of hepatocellular carcinoma (HCC). Based on observations that the C-terminal truncated HBx was frequently detected in HCC, the aim of this study is to evaluate the function of C-terminal truncated HBx in hepatocarcinogenesis.

Methods: MIHA and HepG2 cells transfected with full-length (X2) and C-terminal truncated HBx (X1) were tested for their ability to grow in soft agar and form tumors in nude mice. Proliferation and apoptosis were assessed using XTT and TUNEL assays, respectively. To gain additional insight, the expression profiles of HepG2-X2 and HepG2-X1 were compared using cDNA microarray.

Results: Our *in vitro* and *in vivo* studies demonstrated that the truncated rather than the full-length HBx could effectively transform immortalised liver cell line MIHA. Comparing with X2-transfected cells, X1-transfected cells had stronger oncogenic ability including grew faster, formed more colonies in soft agar, and higher tumourigenicity *in vivo*. Furthermore, C-terminal truncated HBx played an inhibition role in apoptosis. cDNA microarray study indicated that the tumourigenic role of the C-terminal truncated HBx was via the activation of cell proliferation and inhibition of cell apoptosis.

Conclusions: These findings strongly suggest that the C-terminal truncated HBx plays a critical role in the HCC carcinogenesis, the tumourigenic role of the C-terminal truncated HBx was via the activation of cell proliferation and inhibition of cell apoptosis.

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Ab145
Elucidating gene regulatory network of COOH-terminal truncated HBx associated with hepatocellular carcinoma

ASL Cheng, R Zhu, SS Lau, WK Yip, Y Chen, VWS Wong, HLY Chan, JJY Sung
Institute of Digestive Disease and Department of Medicine and Therapeutics, CUHK

Background: Chronic hepatitis B virus (HBV) infection is the major cause of hepatocellular carcinoma (HCC) in Southeast Asia. Although the X protein of HBV (HBx) is highly implicated in hepatocarcinogenesis, the molecular mechanisms are not fully explored. HBx not only activates cytoplasmic signaling cascades but also physically interacts with DNA-bound transcription factors to directly regulate gene transcription in the nucleus. Recent studies have shown that COOH-terminal truncated HBx loses the growth-suppressive effect of full-length HBx and enhances the transformation ability.

Aims: We aimed to elucidate the direct target gene promoters and interacting transcription factor partners that constitute the gene

regulatory network of COOH-terminal truncated HBx in human hepatocytes.

Methods: COOH-terminally truncated HBx (deletion of 14- or 35-amino acid) was amplified from serum of an HCC patient infected with HBV subgenotype Ce carrying the linked-point mutation (L130M and V131I), cloned into lentiviral vector and over-expressed in human non-tumorigenic hepatocyte MIHA cells. Chromatin immunoprecipitation microarray (or ChIP-chip) was performed in conjunction with human promoter arrays containing ~17,000 best defined human transcripts to identify the target promoters of truncated HBx. Transcription factor binding sites in the bound promoter regions were investigated by MATCH software using the TRANSFAC database.

Results: Over-expression of truncated HBx abrogated the growth-suppressive effect of full-length HBx. ChIP-chip analysis identified 1-2% (~250) of the interrogated promoters that were likely regulated by truncated HBx in human hepatocytes. Consistent with the reported function of HBx in cell invasion, genes involved in cell adhesion, motility and migration were significantly enriched. Notably, a high proportion of novel target genes possessed Gene Ontology annotations for transcriptional regulation e.g. the oncogenic transcription factors *PAX9* and *PITX2*. Bioinformatics analysis of HBx-bound promoter regions further revealed over-representation of transcription factor binding sites of STAT, NF-kappaB, E2F, etc that have been shown to promote hepatocarcinogenesis.

Conclusions: The fact that many truncated HBx target genes are also transcription factors/regulators implies a chain reaction, which may explain the cross-activation of multiple pathways by HBx. Further characterisation of the functional interaction between truncated HBx and the putative transcription factor partners in gene regulation will greatly enrich our understanding of HBV-induced hepatocarcinogenesis and provide potential therapeutic targets for treatment of HCC.

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Ab167
Study on the effect of pregnancy on the activity and infectivity of hepatitis B virus in women with chronic hepatitis B infection

T Lao[1], SH Suen[1], TY Leung[1], HLY Chan[2], VWS Wong[2]
[1]Departments of Obstetrics & Gynaecology, PWH, CUHK
[2]Medicine and Therapeutics, PWH, CUHK

The universal neonatal hepatitis B (HBV) vaccination programme has been implemented in Hong Kong for more than two decades, yet cases of HBV infection are still encountered in our paediatric population. The prevalence of maternal chronic HBV infection remains around 10% in this decade. Clearly the current approaches in antenatal screening and neonatal immunoprophylaxis have room for improvement. It is now known that in pregnancy, suppression of the Th-1 and enhancement of the Th-2 systems may facilitate the flaring up of chronic HBV infection and increases its infectivity. Recently, it was reported that antenatal screening using even HBeAg and anti-HBe was no longer sufficiently accurate as 10.5% of the mothers with anti-HBe had viral loads >10[4] IU/ml, and high levels of, maternal serum HBV DNA is associated with higher rates of intrauterine infection and consequent failure of passive-active immunoprophylaxis in the offspring, so that vertical transmission was not completely eliminated. In this prospective longitudinal observational study, 200 pregnant women with chronic HBV infection are being recruited from the antenatal clinic. Serial blood sampling is performed at 12-14 weeks, 20-24 weeks, 34-36 weeks, at labour / delivery, and finally at 6 weeks and then 6 months post-partum, for the measurement of liver function, HBeAg, HBV DNA levels, complete blood count, serum ferritin concentration, and sensitive C-reactive protein. At delivery, a sample of umbilical cord blood will be obtained for the measurement of HBV DNA to determine whether in-utero transmission has occurred. The results of the tests are blinded to the managing obstetricians so that the clinical management of these patients will not be influenced and which will comply with the currently standard non-interventional protocol for HBsAg positive mothers. Immunoprophylaxis to the newborns will be given as per protocol. These tests will provide a profile on the presence or otherwise of any inflammatory process in the body and in the liver with HBV activity and DNA levels. Correlation with stage of pregnancy will enable us to determine whether viral activity changes with the progression of pregnancy and after delivery. The knowledge gained from this study includes the clarification of the impact of pregnancy on HBV activity and replication, and the incidence of in-utero transmission which would account for the failure of neonatal

immunoprophylaxis. On the basis of such information, current policies for the prevention of HBV vertical transmission can be revised, and a rational approach to the monitoring and treatment of maternal HBV carriers can be implemented, based on identified parameters of viral activity, so that vertical transmission of HBV infection can be eliminated in Hong Kong.

Ab260
Identification of liver cirrhosis-specific glycoforms of serum proteins from patients with chronic hepatitis B infection by differential lectin affinity chromatography and quantitative proteomic profiling

TCW Poon, HLY Chan, HWC Leung, A Lo, RHY Lau, AY Hui, JJY Sung
Department of Medicine and Therapeutics, CUHK

Background: Serum markers for sensitive detection of cirrhosis in patients with chronic hepatitis B (CHB) have been lacking. Considerable evidence indicates the carbohydrate side-chains of serum glycoproteins are altered in patients with liver cirrhosis. This study was aimed to identify liver cirrhosis-specific glycosylation variants of serum glycoproteins as potential biomarkers for diagnosis of cirrhosis in CHB patients.

Methods and results: Sialylated glycoproteins and fucosylated glycoproteins were purified from the serum samples from CHB patients with and without liver cirrhosis as well as patients with liver cirrhosis due to chronic hepatitis C infection, non-alcoholic fatty liver disease and autoimmune hepatitis by using SNA and LCA lectin affinity chromatography, respectively. The obtained glycoprotein preparations were quantitatively profiled and compared by two dimensional gel electrophoresis. A sialylated Hp variant and a sialylated clusterin variant were found to down-regulated in CHB patients with liver cirrhosis while our data suggested that fucosylated variants of immunoglobulin were up-regulated. Similar dysregulated regulation trend was observed in patients with liver cirrhosis caused by CHC, alcoholic cirrhosis or autoimmune hepatitis. Significant decreases of the serum s-Hp level and s-Hp% in patients with liver cirrhosis confirmed the proteomic profiling results. However, receiver operating characteristic curve analysis showed that both were not useful biomarkers for detection of liver cirrhosis in CHB patients.

Conclusion and implications: Altered levels of specific glycosylation variants of serum glycoproteins were identified in CHB patients with liver cirrhosis. Some of them were well known to be produced by liver and secreted into the blood stream. To the best of our knowledge, this is the first study providing concrete evidence that particular sialylated Hp variants were down-regulated in CHB patients with liver cirrhosis, as well as in patients having liver cirrhosis due to CHC, non-alcoholic fatty acid hepatitis or autoimmune hepatitis. Novel practical assays that can quantify a specific glycosylated variant of a particular serum glycoprotein are needed to be developed, before we could translate the findings of the current study to routine clinical practice.

Ab271
The changing pattern of hepatitis E infection in Hong Kong

PKS Chan[1,2], WY Lam[1], JCW Chan[1], JJY Sung[2]
[1]Department of Microbiology, CUHK
[2]Stanley Ho Centre for Emerging Infectious Diseases, CUHK

A retrospective review of 57 patients admitted for acute hepatitis E infections in Hong Kong during 2002-2007 showed that the majority of cases were autochthonous, occurring in older adults (female median age: 57 years; male median age: 52 years), and all were sporadic. All cases including seven hepatitis B carriers, one hepatitis C carrier and 13 patients with co-morbidity recovered without the

development of fulminant hepatitis. Phylogenetic analyses on open reading frame (ORF) 1 and ORF2 sequences indicate all except one isolate belonged to genotype 4. The remaining isolate belonged to genotype 3. The isolates of genotype 4 showed more conserved sequences at nt 171-221 and 280-310 of ORF1, and 6461-6495 of ORF2. The predominance of genotype 4 in Hong Kong, and their close phylogenetic relationship with previously reported swine isolates suggested that the source of human infections were from animal reservoirs, most likely food products from domestic swine.

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