HONG KONG COLLEGE OF COMMUNITY MEDICINE

POPULATION HEALTH IN THE POST-COVID-19 ERA: OPPORTUNITIES AND CHALLENGES

ANNUAL SCIENTIFIC MEETING | 25 SEPTEMBER 2021

30 ANNIVERSARY
HONG KONG COLLEGE OF COMMUNITY MEDICINE

Hong Kong College of Community Medicine

Annual Scientific Meeting

"Population Health in the Post-COVID-19 Era: Opportunities and Challenges"

25 September 2021

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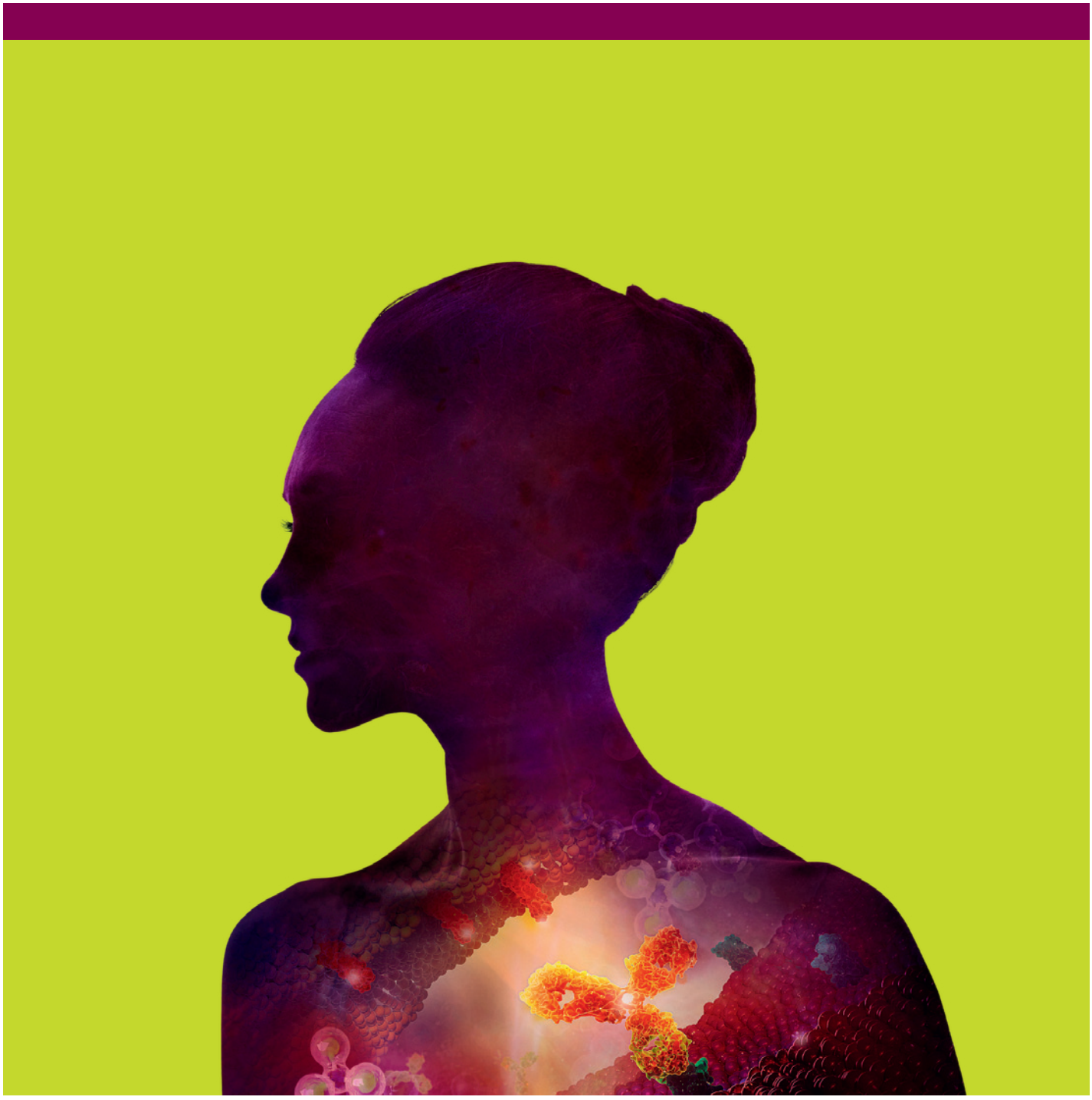

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Annual Scientific Meeting

Programme

9:00 am – 9:15 am	Opening Ceremony
Keynote Address (I) **Moderators : Dr Thomas TSANG and Dr Mandy HO**	
9:15 am – 10:00 am	**Keynote Address (I)** Vaccines and vaccination: Lessons from Covid-19 and the 2009 influenza pandemics ***Prof Keiji FUKUDA*** Director and Clinical Professor School of Public Health, Li Ka Shing Faculty of Medicine, The University of Hong Kong
Keynote Address (II) **Moderators : Dr Libby LEE and Dr Alastair MAH**	
10:00 am – 10:45 am	**Keynote Address (II)** Private Healthcare Opportunity in the Greater Bay Area ***Mr Carl WU*** Chief Executive Officer and Co-Founder New Frontier Group
10:45am – 11:15 am	Tea break
Keynote Address (III) **Moderators : Dr Edmond MA and Dr Fei Chau PANG**	
11:15 am – 12:00 pm	**Keynote Address (III)** Building a better healthcare system in the post-COVID-19 Era ***Dr Tak Yi CHUI*** Under Secretary for Food and Health Food and Health Bureau
Free Papers Session (1 – 4) **(Track: Generic)** **Moderator : Dr Cissy CHOI**	
12:00 pm – 12:15 pm	**Free Paper 1** Facilitators and barriers to receive COVID-19 vaccination among South Asian ethnic minorities in Hong Kong *Ms Akansha SINGH* Jockey Club School of Public Health and Primary Care, The Chinese University of Hong Kong

12:15 pm – 12:30 pm	**Free Paper 2** Global Trends and Risk Factors for Cervical Cancer *Dr Junjie HUANG* Jockey Club School of Public Health and Primary Care, The Chinese University of Hong Kong	
12:30 pm – 12:45 pm	**Free Paper 3** Investigating the temporal changes in incubation period and serial interval estimations to infer the generation time of COVID-19 *Ms Dongxuan CHEN* School of Public Health, The University of Hong Kong	
12:45 pm – 1:00pm	**Free Paper 4** Prediction of Global Influenza Seasons During Post-COVID-19 Pandemic *Dr Sheikh Taslim ALI* School of Public Health, The University of Hong Kong	
1:00 pm – 2:30 pm	*Lunch*	
Parallel Session: Community Medicine Developmental Award / Free Papers Session (5- 7) (Track: Community Medicine)		
Moderator	**Dr Raymond HO**	**Prof Ting Hung LEUNG**
2:30 pm – 2:45 pm	**Free Paper 5** Seroprevalence of unidentified SARS-CoV-2 infection in Hong Kong during three pandemic waves *Dr Junjie HUANG* Jockey Club School of Public Health and Primary Care, The Chinese University of Hong Kong	**Presentation 1** Isolation Facility Planning for Pandemic Preparedness in the Hospital Authority *Dr Flora TSANG* Higher Specialist Trainee Administrative Medicine
2:45 pm – 3:00 pm	**Free Paper 6** Habitual Exercise, Chronic PM2.5 Exposure, and High-Sensitivity C-Reactive Protein: A Longitudinal Study of 40,209 Adults *Ms Yi Qian ZENG* Jockey Club School of Public Health and Primary Care, The Chinese University of Hong Kong	**Presentation 2** Targeted Approach in Promoting COVID-19 Vaccination - Insights from a Knowledge, Attitudes, and Behaviours (KAB) Survey in Hong Kong *Dr Wing Sum LI* Higher Specialist Trainee Public Health Medicine

3:00 pm – 3:15 pm	**Free Paper 7** Long-term exposure to multi-pollutants and lung function in school children: A longitudinal cohort in Hong Kong *Dr Cui GUO* Jockey Club School of Public Health and Primary Care, The Chinese University of Hong Kong	**Presentation 3** New Territories East Cluster's (NTEC) Internal Control on Personal Protective Equipment (PPE) consumption in combating the surge demand during SARs CoV-2 (COVID-19) pandemics in Hong Kong *Dr Ada YU* Higher Specialist Trainee Administrative Medicine
3:15 pm – 3:30 pm	**Reflective Sharing by moderator**	**Presentation 4** Rethinking Alcohol Taxation Policy in Hong Kong: A Modelling Study *Dr Jianchao QUAN* Higher Specialist Trainee Public Health Medicine
Keynote Address (IV) **Moderators: Prof Paul LAI and Dr Peter SO**		
3:30 pm – 4:15 pm	**Keynote Address (IV)** Driving Innovations in Healthcare after COVID-19 ***Prof Hong FUNG*** Executive Director and Chief Executive Officer The Chinese University of Hong Kong Medical Centre	
4:15 pm – 4:30 pm	Closing Ceremony	

Abstracts

for

Keynote Addresses

Keynote Address I :

Prof Keiji FUKUDA
Director and Clinical Professor
School of Public Health,
Li Ka Shing Faculty of Medicine,
The University of Hong Kong

Keiji Fukuda is Director and Clinical Professor at The University of Hong Kong School of Public Health. He previously was the Assistant Director-General for health security, a Special Adviser to the Director General for pandemic influenza and for antimicrobial resistance and was Director of the Influenza Programme at the World Health Organization (WHO) in Geneva. Before that, he worked at the U.S. Centers for Disease Control and Prevention (CDC) as the Epidemiology Section Chief, Influenza Branch. Professor Fukuda has been a global public health leader in many areas including health security and personally has led numerous field investigations, global responses and diplomatic negotiations related to emerging infectious diseases including seasonal, avian and pandemic influenza, SARS, MERS, Ebola and antimicrobial resistance. At WHO, he oversaw implementation of the International Health Regulations and the Pandemic Influenza Preparedness Framework. He is an adviser to the Hong Kong Government for COVID-19.

Vaccines and vaccination: Lessons from Covid-19 and the 2009 influenza pandemics

Since early efforts to address smallpox through practices such as variolation in China, and later advancements pioneered by Edward Jenner, vaccination has become an essential cornerstone of public health. In modern times, vaccination made eradicating smallpox globally and eliminating polio in many regions possible. It is now an indispensable tool for preventing large numbers of cases of measles, tetanus, pneumococcus, influenza and numerous other serious infections.

In the context of respiratory infectious disease pandemics, however, the use of vaccines has been severely limited. In 2009, much of the influenza A H1N1 pandemic had spread before vaccine was available and the greater utility of this vaccine has been to address the subsequent waves of seasonal H1N1 infections. Given this backdrop, the rapid development and availability of vaccines in some locations to respond to Covid-19 has been a major departure from the past. This has been possible due to several reasons including the use of Government initiatives and funding and new international consortia and mechanisms (such as CEPI and HERA) to “push” vaccine development, as well as the use of newer vaccine platform technologies and adaptation of older technologies, and more efficient approaches to provide regulatory approval. The

impact of accelerating the availability and use of such vaccines is clear. Countries with higher vaccination levels have generally achieved better control while vaccinated populations have generally fared much better than unvaccinated counterparts.

Despite such achievements, however, certain aspects of vaccination in the context of Covid-19 are troubling. These include the rise and use of vaccine nationalism and the early cornering of Covid-19 vaccines by rich countries to the exclusion of poorer ones; a generally fragmented approach to the development and testing of Covid-19 vaccines complicating the task of comparing the relative performance of different products; and the highly visible impact of vaccine hesitancy. In this context, there are many questions for the future. Will countries move towards adopting an overall pandemic architecture reflecting multilateral cooperation and relationships or will they continue to retain a more fragmented approach? Will technological innovations used in Covid-19 be applied to other infectious diseases? Will ways be found to counter vaccine nationalism and vaccine hesitancy? Such related issues will be discussed by the speaker.

Keynote Address II :

Mr Carl WU
Chief Executive Officer and Co-Founder
New Frontier Group

Mr. Carl Wu is the Founder and CEO of New Frontier Group. Mr. Wu is a healthcare and internet entrepreneur.

Mr. Wu is the President and Chairman of the Executive Committee of New Frontier Health / United Family Healthcare (NYSE: NFH). He is also the Executive Chairman and Co-founder of YD Care (home healthcare service provider), Heal (oncology group in the Greater Bay area), Boxful Technology (the leading on-demand storage service provider in Asia), HelloToby Technology (the leading online service marketplace in Hong Kong) and Precision Medical. Carl is also the Chairman of Care Alliance (the leading post-acute healthcare operator in China), and the Chairman of NF Greater Bay Area Health Holding.

Prior to founding New Frontier, Mr. Wu was a one of the youngest Managing Directors at Blackstone and executed some of Blackstone's most important investments in China. He was a founding member of Blackstone Asia and was instrumental in establishing Blackstone's businesses across China. Prior to moving to Hong Kong, Mr. Wu was based in Blackstone's London office. Before joining Blackstone, he worked in investment banking at UBS in London.

Mr. Wu holds a Bachelor of Science in Economics from the London School of Economics, where he graduated with First Class Honors.

Private Healthcare Opportunity in the Greater Bay Area

The Guangdong-Hong Kong-Macao Greater Bay Area (GBA) consists of 9 municipalities in the Guangdong Province and also includes the Special Administrative Regions of Hong Kong and Macau. It aims to further deepen cooperation across the region, fully leverage the composite advantages of the three places, facilitate in-depth integration within the region, and promote coordinated regional economic development, with a view to developing an international first-class bay area ideal for living, working and travelling.

Government policies have supported significant growth in the GBA, across areas of infrastructure interoperability, financial interconnection, science and innovation, at the same time supporting local urban strategies. The Gross Domestic Product (GDP) per capita is significantly higher than other economic zones in China, and its GDP growth is over 6.7% year on year.

In particular, healthcare, education and advanced technology has been identified as areas where significant development and growth will occur, leading to countless possibilities in the region.

New Frontier is a leading healthcare investor and operator in China, providing healthcare services and health insurance solutions that leverage cutting edge health technologies. Its portfolio includes 26 hospitals and over 100 clinics across 50 cities in China, mainly in the Tier 1 and Tier 2 cities. 5 of its hospitals have been ranked in the top 50 of the Ding Xiang Yuan Top 100 Hospital Brands List, including those ranked first, fourth and sixth.

This session will outline the healthcare sectors' growth and market opportunities within the GBA, discuss New Frontier's strategy for the region, the process for Hong Kong clinicians to develop cross-border practices, and potential pitfalls to watch out for. It will also highlight the recent policy announcement regarding the use of Hong Kong and Macau medicines and medical equipment in the GBA.

Keynote Address III :

Dr Tak Yi CHUI
Under Secretary for Food and Health
Food and Health Bureau

Dr Chui Tak Yi graduated from the Faculty of Medicine, University of Hong Kong, in 1981. He has served in the public health care system of Hong Kong for more than 30 years. His current duties are to assist and support the Secretary for Food and Health in the setting of policy objectives and priorities on agriculture, fisheries, food safety, veterinary public health, environmental hygiene, medical and health, and related implementation issues, handling Legislative Council business and strengthening the working relationship with Legislative Council, and engaging and liaising with all stakeholders to explain and solicit support for government policies and decisions.

Building a better healthcare system in the post-COVID-19 Era

Health system refers to all the organizations, institutions and resources that are devoted to producing health actions, including efforts to influence determinants of health as well as more direct health- improving activities. Healthcare systems serve the functions of providing health services, financing health services, production of health resources, education and training of health manpower, research and development and management of a National Health System.

Facing the challenge of increasing demand, population growth and ageing, and concern on long term sustainability, there have been periodic and strategic review of the healthcare system of Hong Kong, especially on overall service enhancement, financial sustainability, primary healthcare development. The HKSAR government has determined and put very high emphasis and committed new resources to improving primary healthcare, in addition to the initiatives to address various health issues at the policy level. The setting up of District Health Centres, riding on public private partnership and medical social collaboration, is a new milestone for primary healthcare in Hong Kong. The Primary Healthcare Blueprint will lay a robust foundation for system change in strengthening district based and prevention- focused primary healthcare and in turn reduce the burden on public hospital system in Hong Kong in the long run. At the same time, more innovative, impactful and win-win-win (for the public/private providers and users) public private partnership should be explored for maximal utilization of all resources available in the community.

The HKSAR Government has also committed to reduce the threat of non-communicable disease, including cancer, through better prevention, detection, treatment, rehabilitation and palliation. Development of genomic medicine, building the flagship Chinese Medicine Hospital, updating policies to improve food safety, proposing legislative amendments to ban new smoking products are examples of efforts the Government in protecting health of the public.

COVID-19 brings about a worldwide challenge on healthcare systems, economy, livelihood, physical and mental wellbeing and resilience of the human race in the long and intensive battle against this novel infective agent. Hong Kong has been successful in curbing several COVID-19 waves through legislative means, public health measures (e.g. personal hygiene, social distancing, border control, testing, contact tracing, isolation, quarantine and launching the covid-19 vaccination programme), providing effective treatment and life support, and engagement of experts and the public. Building up capacity of different kinds in very short time frame is a huge challenge. Improving indoor ventilation has become a new focus. Reducing vertical and horizontal transmission in high rise residential buildings is important for Hong Kong. As much more social, educational, commercial and clinical interactions have relied on virtual platforms during COVD-19, further development of Digital Health, especially on interoperability, utilization and multi-stakeholder participation to enhance integration and continuity of care, should be actively pursued. Systemic reviews and research studies will continue to shed light on how the government and the whole community can manage future pandemics better.

While pandemics will go away, Hong Kong has to proactively enhance sustainability and quality of healthcare, respond to the challenge of non-communicable diseases, improve social determinants of health, and harness the power of the digital age. The HKSAR government will continue to co-work with all stakeholders to establish a ‘best fit’ and sustainable healthcare system for Hong Kong, build a healthier community and will certainly be better geared to prevent and manage major public health threats in the future.

Keynote Address IV :

Prof Hong FUNG
Executive Director and Chief Executive Officer
The Chinese University of Hong Kong Medical Centre

Professor Hong FUNG is Professor of Practice in Health Services Management at the Jockey Club School of Public Health & Primary Care, The Chinese University of Hong Kong (CUHK).

He is also the Executive Director and Chief Executive Officer of the CUHK Medical Centre.

Before he joined CUHK in 2014, Professor FUNG was Cluster Chief Executive of the New Territories East Cluster and Hospital Chief Executive of the Prince of Wales Hospital at the Hospital Authority (HA) from 2002 to 2013, overseeing the management and operations of 7 public hospitals.

Prior to that, he worked in the HA Head Office and was responsible for the planning and development of the public hospital services and facilities for over a decade. He spearheaded the development of HA's Clinical Management System and electronic patient records.

Professor FUNG was President (2014-2018) and Chief Censor (2010-2013) of the Hong Kong College of Community Medicine. Professor FUNG is well recognized for his expertise in medical leadership, health planning, health informatics, and health services management.

Professor FUNG teaches health services planning, healthcare innovation and technology management, healthcare financing, communications and marketing, and decision making at the School.

Driving Innovations in Healthcare after COVID-19

The COVID-19 pandemic has revealed weaknesses in health systems across the world. The pandemic is not yet over. Countries are still struggling with overcoming vaccine hesitancy, protecting the vulnerable groups, and finding ways to live with the virus to allow recovery of economic activities. Health system leaders have to face up with challenges uncovered by the pandemic, such as health inequity, care of the chronically ill persons, and increased backlogs in healthcare demand. Since the very early stage of the pandemic, technology has played an unprecedented important role in public health responses including track and trace, quarantine and isolate, telemedicine and telecare, planning and construction of isolation facilities. To address the long term sustained problems of the health system, it is important for healthcare leaders to keep driving for innovations using a whole system approach. The presentation will discuss the key drivers for such innovations.

Abstracts

for

Free Paper Presentation

Facilitators and barriers to receive COVID-19 vaccination among South Asian ethnic minorities in Hong Kong

Akansha Singh [1†], Angel Hor Yan Lai [2,3†], Jingxuan Wang [1], Saba Asim [1], Zixin Wang [1*], Eng Kiong Yeoh [1,2*]

[1]JC School of Public Health and Primary Care, Faculty of Medicine, the Chinese University of Hong Kong, Hong Kong, China; [2] Center for Health System and Policy Research, JC School of Public Health and Primary Care, Faculty of Medicine, the Chinese University of Hong Kong, Hong Kong, China; [3] Department of Applied Social Science, The Hong Kong Polytechnic University, Hong Kong, China;

Background: COVID-19 pandemic continues to have a disproportionate effect on ethnic minorities. Studies reported higher COVID-19 vaccine hesitancy among ethnic minorities.

Objectives: This study investigated the prevalence of COVID-19 vaccination uptake among a sample of South Asians in Hong Kong and its associated factors.

Methods: Participants were South Asian people aged ≥18 years living in Hong Kong, able to comprehend English, Hindi, Nepali or Urdu, and having access to a smartphone. Four non-governmental organizations (NGOs) providing services to South Asian people facilitated the data collection. NGO staff posted the study information in the WhatsApp group involving South Asian clients, and invited them to participate an online survey. A total of 245 participants completed the survey during May 1-31, 2021. Multilevel logistic regression models were fitted.

Result: Among 245 participants, 33.1% (n=81) had taken up at least one dose of COVID-19 vaccination [one dose: n=62 (25.2%), and both doses: n=19 (7.9%)]. After adjusted for significant background characteristics, on the cultural level perceived higher cultural and religious barriers to receive COVID-19 vaccination were associated with lower COVID-19 vaccination uptake (AOR: 0.83, 95%CI: 0.71, 0.97, *P*=.02). On individual-level, having more positive attitudes toward COVID-19 vaccination (AOR: 1.31, 95%CI: 1.10, 1.55, *P*=.002), perceived support from significant others (AOR: 1.29, 95%CI: 1.03, 1.60, P=.03), and perceived higher behavioral control to receive COVID-19 vaccination (AOR: 2.63, 95%CI: 1.65, 4.19, *P*<.001) were associated with higher COVID-19 vaccination uptake, while a negative association was found between negative attitudes and the dependent variable (AOR: 0.73, 95%CI: 0.62, 0.85, *P*<.001). On the social-level, higher exposure to information about deaths and other serious conditions caused by COVID-19 vaccination was associated with lower uptake (AOR: 0.54, 95%CI: 0.33, 0.86, *P*=.01), while knowing more peers who had taken up COVID-19 vaccination was associated with higher uptake (AOR: 1.39, 95%CI; 1.11, 1.74, *P*=.01).

Conclusions: Cultural or religious reasons, perceptions, information exposure on social media, and influence of peers were determinants of COVID-19 vaccination uptake among South Asians. Future program should engage community groups, champions and faith leaders, and develop culturally competent interventions.

Keywords: COVID-19 vaccination; South Asian ethnic minorities; perceptions; information exposure on social media; influence of peers.

Global Trends and Risk Factors for Cervical Cancer

Junjie Huang[1], Veeleah Lok[2], Xianjing Liu[3], Don Eliseo Lucero-Prisno III[4], Chun Ho Ngai[1], Lin Zhang[5, 6, 7], Jinqiu Yuan[8], Xiang-Qian Lao[1], Shelly LA Tse[1], Wanghong Xu[9], Zhi-Jie Zheng[10], Martin CS Wong[1, 7, 10]

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Background: Cervical cancer is the fourth most common cancer and leading cause of cancer mortality among females globally. Determining the epidemiology of cervical cancer is particularly important as it is highly preventable through a combination of primary or secondary preventive strategies.

Objectives: This study aimed to evaluate the most updated worldwide distribution, risk factors, and temporal trends of cervical cancer for different countries and age groups.

Methods: The Global Cancer Observatory database was retrieved for the age-standardized rates (ASR, per 100,000 persons) for incidence and mortality of cervical cancer in 2018. The prevalence of alcohol drinking, smoking, obesity, and hypertension in 2010 was retrieved from the Global Health Observatory database. The associations between prevalence of risk factors and incidence and mortality of cervical cancer and were examined by multivariable linear regression analysis, adjusting for human development index (HDI) and gross domestic products (GDP) per capita. Joinpoint regression analysis was used to calculate the 10-year annual average percent change (AAPC) for incidence and mortality using data from Cancer Incidence in Five Continents and WHO mortality database.

Results: A total of 568,847 new cases (ASR, 13.1) and 311,365 deaths (ASR, 6.9) of cervical cancer were reported globally in 2018. The highest incidence and mortality were observed in Southern Africa (ASRs, 43.1 and 20.0), Eastern Africa (ASRs, 40.1 and 30.0), Western Africa (ASRs, 29.6 and 23.0), Melanesia (ASRs, 27.7 and 19.0), and Middle Africa (ASRs, 26.8 and 21.1); and countries with low HDI (ASRs, 29.8 and 23.0) and medium HDI (ASRs, 15.6 and 9.5) . Population in countries with higher incidence and mortality of cervical cancer have lower

HDI (β=-8.19, 95% CI -11.32 to -5.06, p<0.001; β=-7.66, CI -9.82 to -5.50; p<0.001) but higher alcohol consumption (β=1.89, 95% CI 0.59 to 3.19, p=0.005; β=0.98, CI 0.08 to 1.88; p=0.033), whilst adjusting for GDP, smoking, obesity, and hypertension (p>0.05) . Generally, countries from Asia, Southern American, and Eastern Europe demonstrated a decrease in its incidence whilst countries from Northern Europe and Oceania showed an increase in its incidence. The increasing trend of incidence among the younger population was more drastic than that in the older, with Cyprus (AAPC, 6.96), Sweden (AAPC, 4.88), and Norway (AAPC, 3.80) showing the most prominent rise in individuals < 50 years. Although a decreasing trend of mortality was observed in most countries, the Philippines (AAPC, 5.44), Italy (AAPC, 1.47), and Japan (AAPC, 1.23) reported a significant increase.

Conclusions: The burden of cervical cancer was the highest in regions with low and medium HDI and associated with the prevalence of alcohol consumption. There was an increasing trend in the incidence, particularly in Northern Europe and people of younger age. More intensive primary prevention (including lifestyle modifications and human papillomaviruses vaccination) and secondary prevention (including Pap smear screening and precancerous lesions removal) strategies are recommended for these populations. The reasons behind the epidemiological transitions need to be further investigated.

Investigating the temporal changes in incubation period and serial interval estimations to infer the generation time of COVID-19

Dongxuan Chen[1,2,†], Yiu Chung Lau[1,2,†], Xiao-Ke Xu[3,†], Lin Wang[4], Zhanwei Du[1,2], Tim K. Tsang[1], Peng Wu[1,2], Eric H. Y. Lau[1,2], Gabriel M. Leung[1,2], Benjamin J. Cowling[1,2,*], Sheikh Taslim Ali[1,2]

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Background: The generation time (GT) distribution, the time between successive infections in transmission chains, is often proxied by the serial interval distribution. However, when there is significant pre-symptomatic transmission, some observed serial intervals (SI) can be negative. In theory, unlike estimates of incubation period (IP) of infector and infectee can modulate the estimates of GT. Further, sampling biases could affect the estimates of incubation period and GT. Therefore, we aimed to correct these estimates for sampling bias and estimate temporal GT accounting the effects of NPIs.

Methods: We first constructed the transmission pairs and exposure widows from the line-list information in mainland China during January-February 2020. We estimated the temporal incubation period and serial interval distributions for by using likelihood-based fitting approach and corrected for sampling bias. We developed an inferential framework at the population level using these corrected estimates incorporating a simple decomposition as: forward_GT = forward_SI + backward_IP of infector – forward_IP of the infectee. At the individual level, we used the exposure windows of confirmed transmission pairs to reconstruct the distribution of generation times, taking dependence of transmission into account.

Results: The mean backward incubation period for infector fell in the range (3.8, 9.6) days with increasing trend over time, while mean forward incubation period of infectee found to be more stable and ranged between 5.4 to 7.1 days and the forward SI was decreasing in (2.7, 8.9) days across the epidemic. After correcting the backward IP for infector, the estimates of forward GT found to be slightly decreased over time ranged from 6 to 8 days due to the effect of NPIs. Backward GT construction showed more fluctuations and was less robust than forward GT. We estimated the basic reproduction number around 2.3 – 2.5 by using both forward SI and forward GT during pre-peak, assuming growth rate=0.14. However, using backward SI and backward GT would underestimate R0 to be 1.32 and 1.76 respectively, indicating the importance of forward estimating approach.

Conclusions: Our result suggest to use both incubation period along with serial interval to estimate generation time distribution and hence reproduction number.

Prediction of Global Influenza Seasons during Post-COVID-19 Pandemic

Sheikh Taslim Ali[1,2,†], Songwei Shan[1,2,†], Yiu Chung Lau[1,2,†], Sukhyun Ryu[3,†], Zhanwei Du[1,2], Lin Wang[4], Xiao-Ke Xu[5], Dongxuan Chen[1,2], Jungyeon Tae[3], Peng Wu[1,2], Eric H. Y. Lau[1,2], Gabriel M. Leung[1,2], Benjamin J. Cowling[1,2]

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Background: Various non-pharmaceutical interventions (NPIs) were implemented globally to mitigate COVID-19, which could have modulated the transmission dynamics of directly transmitted viruses including influenza. Further, over time the susceptibility for influenza in community could have significantly increased. We aim to first assess the impact of COVID-19 NPIs on the transmissibility influenza viruses and then predict the forthcoming seasonal influenza epidemics globally.

Methods: We used the surveillance data on influenza virus activity, available for different countries during 2016-2021. We first evaluate the comparable proxy of the influenza activity for each country and estimated transmissibility as instantaneous reproduction number. Then we assess the impact of the NPIs by evaluating the reduction in transmissibility as well as infections by using regression and state-space models and compared with the previous years. Finally, we developed a data-driven simulation based mechanistic predictive model framework to infer the forthcoming influenza epidemic incorporating available information on intrinsic and extrinsic drivers in the models.

Results: We estimated 20% to 42% reduction in transmissibility and 5% to 25% reduction in infections of influenza by the NPIs with variations across the countries based on the respective NPIs implemented. We estimated the threshold of the impact strength of NPIs as 10%-15% reductions in the transmissibility could be sufficient to prevent infections from spreading, hence suppress summer epidemic in sub-tropical locations like Hong Kong. We predicted that the upcoming influenza epidemic will be increased by 2-4 folds in infections under several possible scenarios on timing of the next season and the wining of the effect of COVID-19 NPIs. We estimated a 18% - 45% vaccination coverage for seasonal influenza strains before the start of the season may able to avoid this excess influenza infections in these locations.

Conclusions: Our findings indicate the evidence of the indirect impact of COVID-19 NPIs on mitigating influenza transmission globally. It is important that medical and healthcare settings are prepared for large future influenza seasons across the countries given the loss of immunity to influenza in since early 2020.

Seroprevalence of unidentified SARS-CoV-2 infection in Hong Kong during three pandemic waves

Martin CS Wong MD MPH, Junjie Huang PhD, Paul KS Chan MD

Objective: To estimate the prevalence of unidentified SARS-CoV-2 infection in the general population of Hong Kong.

Design: We performed a prospective cross-sectional study was conducted from April 2020 to April 2021 following each major wave of COVID-19 by recruiting adults in the general population of Hong Kong. We recruited 4,198 citizens aged ≥18 years who had not been diagnosed as having COVID-19 were recruited, and their sociodemographic information, symptoms, travel, contact, quarantine and COVID-19 testing history were collected. SARS-CoV-2 IgG antibodies were detected by an enzyme-linked immunosorbent assay (ELISA) based on spike (S1/S2) protein, followed by confirmation with a commercial electrochemiluminescence immunoassay based on the receptor binding domain (RBD) of spike protein.

Results: There were 903 (22%), 1,046 (25%) and 2,249 (53%) subjects participated during the three recruitments following the three major waves, respectively. The corresponding proportion of participants aged 18-39 years, 40-59 years and ≥60 years was 32%, 39% and 29%; with 60% being female. Among them, 58% stayed in Hong Kong all along since November 2019; whilst 50% had received SARS-CoV-2 RNA tests with negative results. Only 4% reported ever contact with confirmed cases, and 5% had been isolated or quarantined. Up to 67% did not recall of any illnesses; whilst 18%, 5% and 9% had experienced respiratory symptoms, gastrointestinal symptoms, or both, respectively, prior to testing. Six subjects were confirmed to be positive for anti-SARS-CoV-2 IgG, inferring an adjusted prevalence of unidentified infection of 0.15% (95% C.I. 0.06% to 0.32%). Extrapolating these findings to the whole population, there were less than 1.9 unidentified infections for every recorded confirmed case. The overall prevalence of SARS-CoV-2 infection in Hong Kong before the rolling out of vaccination was less than 0.45%.

Conclusions: The prevalence of unidentified SARS-CoV-2 infection was very low, implying the success of the pandemic mitigation by stringent isolation and quarantine policies even without complete city lockdown. More than 99.5% of the general population remain naïve to SARS-CoV-2, highlighting the urgent need to achieve a high vaccine coverage.

Acknowledgements: The study was supported by the Health and Medical Research Fund -Commissioned Research on the Novel Coronavirus Disease (COVID-19) (reference no. COVID190108) from the Food and Health Bureau, Hong Kong SAR Government.

Habitual Exercise, Chronic $PM_{2.5}$ Exposure, and High-Sensitivity C-Reactive Protein: A Longitudinal Study of 40,209 Adults

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Background: Exercise may increase the inhaled amount of air pollutants and exacerbate the adverse health effects. However, it remains unknown what are the combined effects of habitual exercise and exposure to air pollution on inflammation, the underlying pathophysiology of cardiovascular diseases and other non-communicable diseases.

Objective: We investigated the combined effects of chronic exposure to particulate matter with an aerodynamic diameter less than 2.5 μm ($PM_{2.5}$) and habitual exercise on high-sensitivity C-reactive protein (CRP), a sensitive marker of inflammation, in a cohort of Taiwan residents.

Methods: The present study included 40,209 adults (≥ 18 years old) who participated in a standard medical examination program between 2001 and 2016. The two-year average of PM2.5 exposure was estimated using a satellite-based spatiotemporal model. Information on habitual exercise was collected using a standard self-administered questionnaire. Generalized linear mixed-effects models (GLMM) were used for data analysis to investigate the associations of CRP with chronic $PM_{2.5}$ exposure and habitual exercise in baseline and longitudinal data analyses. An interaction term between $PM_{2.5}$ and habitual exercise was included to examine the overall interaction effect.

Results: Compared with the participants with high level of habitual exercise, those with moderate and inactive levels of habitual exercise had a 6.87% [95% confidence interval (CI): 4.38%, 9.41%] and a 11.20% (95%CI: 8.49%, 13.90%) higher level of CRP, respectively. Compared with the participants with low level of PM2.5 exposure, those with exposure to moderate and high levels of PM2.5 had a 2.09% (95%CI: -0.53%, 4.77%) and a 5.61% (95%CI: 1.99%, 9.35%) higher level of CRP, respectively. Similar results were found in the longitudinal analysis. No significant interactions between PM2.5 and habitual exercise on CRP were observed in both baseline and longitudinal data analyses (P= 0.46 and 0.23).

Conclusions: A higher level of habitual exercise and a lower level of $PM_{2.5}$ exposure are associated with lower CRP levels. The beneficial effects of habitual exercise remain in people exposing to different levels of $PM_{2.5}$. Our study suggests that habitual exercise is a safe approach for cardiovascular health promotion and should be promoted even for people in relatively polluted areas.

Long-term exposure to multi-pollutants and lung function in school children: A longitudinal cohort in Hong Kong

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Background: Association between long-term exposure to multiple pollutants and lung function in children are not well-documented, especially in Hong Kong where air pollution is serious. This study aimed to examine the associations of long-term exposure to ambient $PM_{2.5}$, NO_2 and O_3 with lung function in school children in Hong Kong.

Methods: A total of 4,553 children (aged 6–15 years old) with 7,054 spirometric measurements were included between 2012 and 2017. Spatiotemporal models were used to estimate the annual average of ambient $PM_{2.5}$, NO_2 and O_3 exposures for each participant. We measured the spirometry parameters for each student: including forced vital capacity (FVC) and forced expiratory volume in 1 s (FEV_1). A generalized linear mixed model was used to examine the longitudinal associations between long-term exposure to the air pollutants and lung function after adjusting for a series of confounders. A generalized linear model was used to examine the cross-sectional associations between the air pollutants and lung function. Sensitivity and stratified analyses were also conducted.

Results: The mean age of the students was 9.6 years. Each 10μg/m^3 increase in annual average of $PM_{2.5}$ was associated with a decrease of 0.60% in FVC [95%confidence interval (CI): 0.03% to 1.16%] and 0.11% in FEV_1 (95% CI: -0.47% to 0.69%). Each 10μg/m^3 increase in annual average of NO2 was associated with a decrease of 0.12% in FEV_1 (95% CI: -0.08% to 0.33%). For the cross-sectional analysis, we found that each 10μg/m3 increase in $PM_{2.5}$ and NO_2 was associated with a decrease of 1.14% (95% CI: 0.24% to 2.03%) and 0.07% (95% CI: -0.18% to 0.32%) in FVC, respectively. The associations between O_3 and lung function were weak in both cross-sectional and longitudinal associations. Sensitivity and stratified analyses showed that the estimated associations were generally similar.

Conclusions: Long-term exposure to ambient $PM_{2.5}$ and NO_2 were inversely associated with lung function. The associations between ambient O_3 and lung function were relatively weak in school children in Hong Kong.

Abstracts

for

Community Medicine Developmental Award

Isolation facility planning for pandemic preparedness in the Hospital Authority

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Background: The COVID-19 pandemic has exposed fundamental issues in healthcare systems in many countries, bringing challenges and opportunities to the healthcare sector. Opportunities have blossomed in several areas, such as the accelerated adoption of digital transformation, heightened awareness to emergency preparedness, enhanced communication in response to disinformation, healthcare research development, accelerated capability and capacity building.

Issues to discuss: The need to enhance the infectious disease facilities in Hong Kong has been revealed since the outbreak of Severe Acute Respiratory Syndrome (SARS) in 2003. As a result, the adoption of isolation facilities in several selected acute hospitals has allowed more operational flexibility and has effectively equipped frontline staff for the next infectious disease crisis.

Faced with the COVID-19 pandemic, the Hospital Authority has further accumulated experience in the emergency preparedness for infectious diseases. Further enhancement in isolation facilities has been performed, including the ventilation upgrades in wards, and the construction of the Hong Kong Infection Control Center. Opportunities have arisen to improve the planning and future provision of isolation facilities in new and hospital redevelopment projects. Relevant stakeholders were involved in the discussion of the latest recommendations. These stakeholders include the nominated representatives from Cluster Chief Executives (CCES), clusters' planning team heads, chairpersons and subject officers of relevant specialties and the corporate subject lead. Strong differing views and comments were encountered.

Measures: With aligned principles and goals amongst all parties, the different phases of the negotiation process were conducted with active listening, information exchanges, bargaining and problem solving. Consensus was achieved and recommendations were given on the planning and provision of isolation facilities, including air-borne isolation facilities in the Emergency Department, Radiology Department, wards, endoscopy suites, operating theatres, cardiac catheterisation laboratories and delivery suites in new and hospital redevelopment projects.

Conclusions: Differences in perception, views and opinions are commonly encountered in workplace, especially in situations where various stakeholders of diverging interests are involved. Resolution of conflicts or differences in opinions via the negotiation process, putting our patients' interests as our common goal and priority has allowed us to achieve a mutually agreeable outcome.

Targeted Approach in Promoting COVID-19 Vaccination – Insights from a Knowledge, Attitudes, and Behaviours (KAB) Survey in Hong Kong

Li Wing Sum

Background/Problem: Allowing members of the public to be timely administered with safe and effective COVID-19 vaccines is crucial to the fight against the epidemic. However, public distrust, disinformation, coupled with the fact that COVID-19 vaccines are recently developed, may contribute to vaccine hesitancy. To inform communication strategy, the Department of Health (DH) commissioned a territory-wide Knowledge, Attitudes, and Behaviours (KAB) Survey of COVID-19 Vaccination in Hong Kong.

Methods: A telephone survey was conducted in late March 2021 for land-based non-institutional Hong Kong residents aged 18-75. The bilingual questionnaire with 15 questions collected demographic data, KAB regarding COVID-19 vaccination, factors influencing decisions, and channels from which respondents obtain COVID-19 vaccine information. Data were adjusted to align with the gender-age distribution of population in Hong Kong. Statistical analysis were performed using SPSS.

Results/ Findings: 1,203 eligible cases were successfully interviewed (response rate 21.7%). One-third of respondents claimed they were actively looking for more information about COVID-19 vaccines, mostly in the Internet (51.4%) and TV (27.7%). One-quarter of respondents did not know about COVID-19 vaccine side effects. 11.2% falsely claimed facial palsy as common side effects, more among those aged under 45 and with higher education level.

Females and those aged 18-24 were more likely to choose not to get vaccinated. The main reason not to get vaccinated was “worry about side effects” (51.6%), followed by “doubts on vaccine quality and safety” (42.5%). Females were more likely to think that COVID-19 vaccines are not effective (18.1% vs. 13.2% for males).

Opinions of experts in infectious diseases or vaccines, and of healthcare professionals were found to be most influential in the decision to vaccinate (61.9% and 60.0%), more so among those aged under 35. Least respondents considered celebrities / key opinion leaders’ opinions influential (up to 39.8% in those aged 18-24).

Conclusions: The study supports a targeted approach in conveying concise messages on COVID-19 vaccines through effective channels to specific population groups. Especially for younger people, correct information on side effects should be provided through online media, supported by experts and healthcare professionals. Catering for female perspectives may help close the gender difference in perceived vaccine efficacy.

Acknowledgements:

Co-authors at Health Promotion Branch, Department of Health, Government of Hong Kong SAR

- Ms TO Kit Ching, Loretta, SO(HP)1
- Dr WONG Hoi Kei, SMO(HP)1
- Dr WONG Wai Ying, Ada, SMO(HP)3
- Dr WONG Man Ching, Anna, SMO(SD)
- Dr HO Lei Ming, Raymond, Head, HPB

Presentation 3

New Territories East Cluster's (NTEC) Internal Control on Personal Protective Equipment (PPE) consumption in combating the surge demand during SARs CoV-2 (COVID-19) pandemics in Hong Kong

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Background: Stringent infection control during the COVID-19 pandemic led to surge of PPE consumption in hospitals. In early 2020, global shortage of PPE endangered the lives of healthcare workers (HCWs) and contributed to cross infection among HCWs in many countries.

Issues to discuss: HCWs in Hong Kong Public Hospitals were overwhelmed by the threatening consequence of COVID-19 infection. A huge surge in consuming PPE at the early phase of the pandemics had caused PPE stock fell short. The hospital management found that Enterprise Resource Planning System (ERP) designed for stock management could not effectively monitor and control the stock-in and stock-out of individual hospital warehouse.

Quality Initiatives and Data Analysis: A Working Group was set up in NTEC to manage the utilization of PPE in seven local hospitals and ensure vigilance usage of PPE in a coordinated manner. PPE stock-level as raw data was converted to administrative information to assist management decisions. An equitable system was established to regulate the usage of PPE across cluster hospitals. In order to reflect the actual consumption, Clinical Departments were requested to report their PPE stock-level daily during the first few months of the pandemic. Stock-level differences between daily stock-take information and the stock-supply in hospital warehouses were used as a proxy to reflect the actual daily consumption. Hence, the working group can predominate the consumption rate and stock projection (stock-last) down to individual clinical department.

Results and Measures: With new system, outlier departments with unnecessary stockpiling or abnormal consumption could be identified for follow-up analysis. Implemented interventions included:

- Refine and promulgate PPE guideline
- Reduce consumption by cutting down non-essential elective services
- Redistribute stock from low to high-risk clinical areas.
- Adopt alternative PPE items
- Adopt transparent communication strategies

Reduction in consumption rate was observed after adopting new measures. No cross infection among HCWs was reported during the pandemics since 2020.

Conclusions: Timely management of strategic stockpile PPE was crucial to combat the pandemics. Critical step was to master the real-time utilization pattern at early stage: analyze available raw data and transform them into administrative information in a systematic manner. It allowed hospital management team to make timely and decisive strategic actions.

Rethinking alcohol taxation policy in Hong Kong: a modelling study

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Background: Uniquely among high-income economies, Hong Kong eliminated taxes on wine and beer in 2007-2008. Alcohol-related harm is preventable; the East Asia region has the highest alcohol-attributable fraction for cancer worldwide.[1]

Issues: Hong Kong's policy of eliminating alcohol taxes is in stark contrast to WHO "best buys" recommendations to reduce alcohol-related harm. We model the population health impact of the reversing the 2007-08 taxation policies on alcohol-attributable harm and medical costs in Hong Kong.

Methods: We conducted an epidemiological econometric modelling study to compare the impact of pre-2007 tax levels (80% on wine and 40% on beer) to 0% currently. Behavioural Risk Factor Survey (2004-2005, 2009-2010, 2014-2015) was used to estimate the price elasticities of demand for alcoholic beverages using the Almost Ideal Demand System (AIDS) model2, and parameterise alcohol consumption patterns. Alcohol-attributable health burden was estimated using the International Model of Alcohol Harms and Policies (InterMAHPv3)3 calibrated to Hong Kong-specific alcohol-related morbidity and mortality data from the Hospital Authority CMS and cancer registry. We applied pooled relative risks separately for men and women from World Health Organization 2018 Global Status Report on Alcohol and Health.4 Annual direct medical costs were estimated for each attributable condition using generalised linear regression on public sector healthcare service utilisation and adjusted for comorbidities. Sensitivity analysis was performed using Euromonitor sales data and 2016 Global Burden of Disease (GBD2016) for estimates of price elasticity and relative risk.

Results: Reintroducing pre-2007 taxes reduces the alcohol-attributable disease burden: cancers by 36.1% (oral cavity and pharynx, 78.3%; oesophageal, 73.0%; laryngeal, 69.6%; colorectal, 24.2%; liver, 20.8%); liver cirrhosis by 60.8%; acute and chronic pancreatitis by 46.0% and 53.7%; and haemorrhagic stroke by 44.5%. Higher reductions were observed for wholly alcohol attributable conditions. Annual savings in direct medical care is estimated at USD 5.0 million (HKD 38.7m). Alcohol consumption and alcohol-related harms were higher for males than female.

Conclusions: Reintroduction of taxes to reduce alcohol-related burden of disease merits consideration. Given the wide social and effects of alcohol harm the overall benefit to population health is likely to be even greater.

References/Acknowledgements: We thank Department of Health and Hospital Authority for data access. This project was supported by Health and Medical Research Fund, Food and Health Bureau, Government of the Hong Kong SAR, China (03170067).

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Abstracts

for

Poster Presentation

Long-term exposure to air pollution and allergic rhinitis in schoolchildren: A cohort study in Hong Kong

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Background: Allergic rhinitis (AR) in children is a major public health concern. However, evidence on the relationship between long-term exposure to air pollution on risk of AR is limited and inconsistent. This study aimed to evaluate the association between long-term exposure to air pollution and odds of AR in schoolchildren in Hong Kong.

Method: A total of 4310 children (mean age: 9.8 years, 49.8% boys) from 27 primary schools in Hong Kong were recruited in this study. Self-administered questionnaires were completed by parents/guardians to collect detailed information on respiratory symptoms. A satellite-based spatiotemporal model at a high resolution (1 km2) was adopted to evaluate the PM2.5 concentration at each child's home address. The statistically spatiotemporal model based on the geographically and temporally weighted regression (GTWR) model was used to derive surface NO2 and O3 levels at a resolution of 100 m2. Multinomial logistic regression model was adopted to evaluate the relationship between long-term exposure to air pollution and odds of AR.

Results: No significant associations between the prevalence of AR and NO2, O3, or PM2.5 were observed. The odds ratios (ORs) were 0.95 (95% confidence interval [CI], 0.83–1.08), 1.01 (95% CI, 0.88-1.15), and 0.93 (95% CI, 0.80-1.07) for exposure to each 1-Standard Deviation (1-SD) increase of pollutants, respectively.

Conclusion: Exposure to air pollution may not be associated with increased risk of AR in schoolchildren. Further studies from more polluted areas are warranted to verify our findings.

Acknowledgement: This work was supported by the Health and Medical Research Fund (16170601).

Keywords: Allergic rhinitis; Air pollution; School-age children.

Poster 2

Drinking behaviors of young Hong King adults during COVID-19

Rufina H.W. Chan, Dong Dong, Jean H. KimR

Purpose: This study aims to investigate the changes in alcohol consumption behaviors of Hong Kong young adults during COVID-19.

Background: The 2019 Coronavirus pandemic has significantly impacted our way of living. Studies from abroad have shown that social isolation and lockdowns are associated with greater uptake of alcohol consumption. Between 2020 until mid-2021, the Hong Kong government has implemented a range of measures, including complete closure of bars and nightclubs and prohibitions against dine-in services at restaurants.

Methods: An anonymous cross-sectional telephone survey of 300 Hong Kong Chinese young adults, ages of 18-34, was conducted in June 2020. Multivariable logistic regression (MVLR) was conducted to examine the predictors of drinking behaviors during COVID-19.

Results: Among the 118 past year drinkers, 63.6% reported unchanged drinking behavior, 35.6% decreased in alcohol consumption, and only 1 respondent increased the alcohol intake. Of those who decreased their drinking levels, most of them were male (69%), single and living with parents (69%), university educated (66.7%), and working a full-time job (73.8%). Being a binge drinker (OR=2.09), typically purchasing alcohol from bars and nightclubs (OR= 4.68), having a higher alcohol knowledge score (OR= 2.38), and scoring higher on the negative drinking consequences expectancy scale (OR=1.11) were all associated with decrease in alcohol consumption during COVID-19. Meanwhile, participants who believed alcohol is beneficial for work relation (OR=0.73) were less likely to decrease their drinking.

Conclusion: Hong Kong youths mostly drink in a group setting and for celebratory purposes. Thus, government social distancing measures has decreased alcohol uptake. Government officials should be mindful of the potential surge in alcohol uptake upon bars and clubs reopening.

Poster 3

Pilot Survey for Antimicrobial Resistant Microorganisms in Food in Hong Kong

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The purpose of the Pilot Survey for Antimicrobial Resistant Microorganisms in Food in Hong Kong was to collect baseline information of antimicrobial resistance (AMR) in food on sale in the local market with a view to understanding and guiding the development of an AMR surveillance system in food in Hong Kong.

A total of 1155 food samples, including 851 raw meat (beef, chicken meat and pork) and 304 ready-to-eat (RTE) food (vegetables, salmon and tuna sashimi) were collected from local wet markets and supermarkets between December 2019 and June 2020. Extended spectrum beta-lactamase (ESBL)-producing Enterobacteriaceae (ESBL-PE), meropenem-resistant organisms (MRO, including Enterobacteriaceae, Acinetobacter spp. and Pseudomonas aeruginosa) and vancomycin-resistant Enterococcus spp. (VRE) were selectively isolated from the samples. Species and resistance of the isolates were confirmed by Matrix-Assisted Laser Desorption/ Ionization-Time of Flight (MALDI-TOF) and antimicrobial susceptibility test respectively.

ESBL-PE were isolated from 679 (79.8%) raw meat and 42 (13.8%) RTE food samples. Among the raw meat samples, chicken meat (88.1%) had the highest percentage of ESBL-PE positive samples, followed by pork (84.7%) and beef (65.8%). Percentages of ESBL-PE positive samples among RTE food types were similar (vegetables 14%, salmon sashimi 15.7%, tuna sashimi 11.2%). MRO were isolated from 98 (11.5%) raw meat and 5 (1.6%) RTE food samples. VRE were not isolated from any of the samples. Escherichia coli was the predominant species isolated from raw meat, while the species isolated from RTE food were more diverse.

In view of the results, the Centre for Food Safety will continue to promote food safety to public and trade to prevent the spread of AMR via food. Risk communication work include issue of social media posts and videos and maintain a thematic webpage on AMR, educate food handlers on AMR and food safety at training courses and trade talks and conduct studies on food handlers' knowledge and attitude on food safety and AMR. The result and experience of the Pilot Survey will be used in the development of routine surveillance of AMR in food in Hong Kong.

Poster 4

Using Consolidated Framework for Implementation Research to Investigate Facilitators and Barriers of Implementing Alcohol Screening and Brief Intervention among Primary Care Health Professionals: A Systematic Review

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Background: Alcohol screening and brief intervention (SBI) is recommended to be implemented in primary care settings to intervene against hazardous/harmful drinking. However, studies showed that the uptake rate was low in many regions/countries.

Objectives: This systematic review presented current findings on the facilitators and barriers of implementing SBI among health professionals in primary care settings using the Consolidated Framework for Implementation Research (CFIR) which consists of 5 major domains: (1) intervention characteristics, (2) inner setting, (3) outer setting, (4) characteristics of the individuals, and (5) the process of implementation.

Methods: We included qualitative, quantitative and mixed-method studies identified through four electronic databases (PubMed, OVID-MEDLINE, PsycInfo, and Web of Science). Articles that were included had to address barriers and facilitators of SBI implementation and provide sufficient detail that the CFIR domains could be identified and data were abstracted using a standardized extraction form.

Results: A total of 74 studies published during the period from 1986 to 2019 were finally analysed and summarized. The most common facilitators were knowledge and positive beliefs (characteristics of the individuals) of SBI and available resources (inner setting), whilst the most common barriers were cost related to implementing SBI (intervention characteristics), negative beliefs about SBI (characteristics of the individuals), and lack of self-efficacy to implementing SBI (characteristics of the individuals). It could be observed that factors related to inner setting and characteristics of the individuals were extensively studied whilst process received the least attention.

Conclusions: Most of the facilitators and barriers are modifiable. Besides, most literature focused on various kinds of available assets to implementing SBI. To promote the spread of SBI implementation, more high-quality studies on the implementation process are needed. This systematic review could serve as a reference framework for health authorities to devise strategies for improving the implementation of SBI in primary care settings.

Associations between COVID-19 related stigma and sleep quality among COVID-19 survivors six months after hospital discharge

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Background: Many COVID-19 survivors reported stigmatization after recovery. Emerging evidence showed that COVID-19 survivors had poor sleep quality after hospital discharge. There was a lack of studies investigating the association between stigma and sleep quality among COVID-19 survivors.

Objective: This study investigated the association between stigma (discrimination experiences, self-stigma and perceived affiliate stigma) and sleep quality among COVID-19 survivors six months after hospital discharge.

Methods: Participants were recovered adult COVID-19 survivors discharged between February 1 and April 30, 2020. Medical staff of 5 participating hospitals approached all discharged COVID-19 survivors during this period. A total of 199 participants completed the telephone interview during July to September, 2020. Structural equation modeling was performed to test the hypothesis that resilience and social support would mediate the association between stigma and sleep quality.

Results: The results showed that 10.1% of the participants reported terrible/poor sleep quality, 26.1% reported worse sleep quality in the past week when comparing their current status versus the time before COVID-19. After adjusting for significant background characteristics, participants who had higher number of discrimination experience, perceived stronger self-stigma and

stronger perceived affiliate stigma reported poorer sleep quality. Resilience and social support were positively and significantly associated with sleep quality. The indirect effect of self-stigma on sleep quality through social support and resilience was significant and negative. Perceived affiliate stigma also had a significant and negative indirect effect on sleep quality through social support and resilience.

Conclusions: Various types of stigma after recovery were associated with poor sleep quality among COVID-19 survivors, while social support and resilience were protective factors. Resilience and social support mediated the associations between self-stigma/ perceived affiliate stigma and sleep quality.

A reflection on the local corporate policy of patient referrals from the Hospital Authority to private sector

TK CHAN

Background: The Hospital Authority (HA) has a policy in place to forbid HA doctors from recommending a specific private healthcare provider (PHP) where patients are referred to private healthcare sector for follow-up management, even upon patient's request and even when The HA does not provide a list of qualified PHPs. A recent local court judgment upheld the legitimacy of the policy. This article seeks to reflect on the policy from legal and ethical perspectives.

Methodology: Relevant law and ethics were reviewed. A normative analysis was performed.

Findings: It is in the patients' interests to be provided The Information (of a specific PHP who in the knowledge of the referring HA doctor has the skills and competence to provide the onward care). Even when there is financial or intimate relationship between the referring doctor and recommended PHP, disclosing The Information altogether with disclosure of the relationship should be favoured over withholding The Information. The policy to curtail patients' legitimate right to The Information on the fragile basis of avoiding perceived conflict may fall short of public expectations for HA doctors to duly discharge their duties to care for the sick.

Conclusions: The policy unfairly calls into question the integrity of HA doctors while weighing patients' interest too lightly on the balance. The notion of perceived conflict of interests is arguably conceived only for administrative purposes, with the public being the scapegoat and the patients bearing the consequences. This will unlikely withstand the test of proportionality in a court of law or ethical deliberation.

A cross-sectional survey study of association between self-reported health status and temporary settlement conditions of 2020 flood-affected rural communities in Neijiang City, Sichuan, China

Miss Sharon Chow

Background and Objectives: Globally, climate change has led to increase in floods and extreme events. WHO advocates for better Health-Emergency Disaster Risk Management (Health-EDRM) in disaster prone area to improve resilience, reduce health risks and protect well-being of affected population. In China, floods affect rural population disproportionately and pose affected population to socio-economic vulnerability and poor health outcomes. Although affected communities often have to live in transitional shelters with poor living environment, evidence on the impact of these suboptimal shelters on health are limited. This study aims to examine settlement patterns and associations between self-reported health outcomes and indoor environmental parameters in transitional settlement of the flood affected communities.

Methods: This is a cross-sectional survey study of rural households (n=90) affected by flood occurred in August 2020, who resided in transition settlement (for 3-5 days) in Chonglong and Guide Township in Neijiang City of Sichuan. Purposive random sampling, assisted by local partner humanitarian organization, was conducted and anonymous, interviewer-administered questionnaires were used for data collection. Information on socio-demographic characteristics, self-reported respiratory and cardiovascular diseases status, indoor environmental parameters, healthcare-seeking behaviors were collected. Descriptive and multivariable regression analysis were conducted to understand the associations among socio-demographic characteristics, environmental parameters of the temporary settlement and self-reported health outcomes.

Results: Among the displaced population, 61.8% settled in local school/public premises while the others took temporarily residence with their relatives/friends, hotels and other temporary shelters. Majority of the older displaced individuals tended to spend longer duration (>19hrs daily) in the settlement. For self-reported health outcomes, 31.5% of the respondents reported their health as “fair/poor” and 30.6% reported of worsening of health status when compared with before the flood. Participants living in public premises regarded their living conditions as satisfactory but concern of health risks such as vectors borne diseases (mosquito) was cited. Socio-demographic predictors of poorer health outcomes and suboptimal living environment in the settlement were explored.

Conclusion: Indoor settlement environment did not show a strong correlation with self-reported morbidity of respiratory and cardiovascular diseases in immediate, temporary post-flood settlement. With population aging and increases health risks with climate change, an integrated model to understand the impacts of socio-economic status, housing environment and other health outcomes is needed to decrease vulnerability, improve community resilience and assist better Health-EDRM programs and policy planning.

Digital surveillance of emerging or re-emerging diseases: scarlet fever as an example

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Introduction: Surveillance systems are crucial in monitoring disease activity and detecting emerging infections. Conventional surveillance systems usually target at diseases leading to high morbidity or mortality burden, but may lack sensitivity in detecting newly emerging infections. Given the abundance and affordability of digital information such as internet search engines and mobile apps, digital surveillance could supplement existing surveillance to provide earlier warning of emerging diseases. In this study, we validated the use of Google queries of scarlet fever using routine surveillance data, and inferred disease trend of scarlet fever in other countries/regions where specific surveillance for scarlet fever is not available.

Methods: We collected scarlet fever surveillance data from Hong Kong, England, Germany and Taiwan from where surges in scarlet fever incidence have been reported. We obtained language-specific Google queries of scarlet fever corresponding to the time period where surveillance data was available in each country/region. We constructed Poisson regression models by including trends, annual and biannual seasonality and tested for their significance using likelihood ratio tests, and also tested the presence of change point, separately for scarlet fever surveillance data and Google queries. The same method was applied to characterize Google query data for scarlet fever in other countries/regions.

Results: We identified change points in scarlet fever incidence resulting in long-term level changes from Hong Kong and England in 2011 and 2014, respectively. Although no change point was detected in Germany and Taiwan, both showed increasing trends. The overall characteristics identified from Google query data were consistent with those from existing surveillance data in each country/region, such as disease trend, seasonality and long-term change in disease incidence.

Among 63 countries/regions studied, we identified level changes in Argentina, China, Egypt, Ireland, South Korea, Philippines, Serbia, Singapore and United Arab Emirates. 38/63 (60.3%) of the countries/regions showed increasing trends. Seasonality was frequently observed across countries/regions.

Conclusion: We validated Google queries of scarlet fever using 4 countries/regions with existing surveillance data. Digital data suggested increased scarlet fever incidence globally. Our findings highlight the potential use of digital surveillance for detection of re-emerging and emerging diseases and may strengthen pandemic preparedness and response.

COVID-19 and human collective behavior in Hong Kong

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During extreme occurrences, such as the COVID-19 crisis, people are more prone to engage in collective behavior online to convey their awareness, activities, and concerns. Since the first COVID-19 case was confirmed on January 22, 2020, Hong Kong has implemented strict public health and social measures (PHSMs) to combat COVID-19 pandemic waves. In this paper, we present a methodology for evaluating connections between people's emotions, perceptions, and online behaviors in Hong Kong during the first two waves (February to June 2020), and we found a strong link between online Google search behavior and real-time reproduction numbers. We conducted 10 rounds of cross-sectional telephone surveys with around 7500 local adult inhabitants from February 1 to June 20 in 2020 to validate the model's risk perception output and to quantify risk perception levels over time. When compared to survey results, our network-based mechanistic model estimations of individual risk perception reflect 80% of the trend in people's risk perception (individuals worried about becoming infected) across the study period. We may need to re-energize the public by involving them in the solution so that they can live their lives with less risk.

Narrative review of scientific evidence on the effectiveness of health-EDRM primary preventive interventions against water-borne diseases in contexts with inadequate safe drinking water

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Background: Globally, water-borne diseases account for 1.5 million deaths annually and climate change will likely exacerbate the associated human health impact. Associated with Water, Sanitation and Hygiene practices (WASH), these diseases particularly affect children living in low-income households, especially in areas facing water insecurity. The WHO Health Emergency and Disaster Risk Management (health-EDRM) Framework (2015) highlights the importance of primary prevention against biological hazards across all levels of society. The framework encourages multi-sectoral coordination and lessons sharing for building community risk resilience.

Purpose: Currently, there is limited scientific review of published evidence relating to how interventions can be applied to Health-EDRM policy and programme planning to improve WASH. Using the health-EDRM framework, behavioral measures for prevention of water-borne diseases, with their enabling and limiting factors at various implementation levels, were evaluated.

Method: Keyword search was conducted in PubMed, Google Scholar, Embase, Medline, Science Direct, WHO and CDC online publication database. Using OCEBM as a review framework, a narrative review that examined primary-level interventions targeting water-borne diseases in resource-poor settings was conducted for English-language articles published between January 2000 and March 2021. Full texts of potential papers were assessed and excluded if the effectiveness of the primary prevention was not reported. The strength of evidence, the enabling factors, barriers to implementation, health co-benefits, and alternative measures were also reviewed.

Results: The study identified 88 articles and the scientific evidence were grouped into 8 main primary interventions for water-borne diseases that are implemented at personal, household and community levels. There is an array of evidence available across each of the interventions, with strong evidence supporting the effectiveness of water treatment and safe household water storage. Current studies show that at personal and household levels, the effect of each of these primary interventions is enhanced when applied together.

Conclusion: This study showed gaps and discrepancies in definitions of various WASH related interventions for practical application of Health-EDRM evidence in resource-poor settings. In order for a global achieve of the SDG 2030 health goals, mitigation against water-borne diseases will require coordinated, multi-sectoral approaches from governance authorities such as building sanitation infrastructure, and streamlined waste management.

A narrative literature review on cataract surgery during the COVID-19 pandemic – Implication on "new normal" of community service provision

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Objectives: This study is a narrative review on existing evidence and opinion regarding the risk of conducting elective cataract surgery in adults during the COVID-19 pandemic, considering safety to patients, healthcare professionals, and implications on health systems governance.

Methods: A keyword-search-based narrative review was conducted using databases PubMed, Medline and Science Direct, between 31 January 2020 and 1 June 2021.

Results: 80 English-language publications were identified that relate to COVID-19 and conducting elective cataract surgery in adults. Ophthalmology society guidelines on cataract surgery during COVID-19 were also reviewed as case studies. The review indicated published studies identified four major areas for risk-consideration, these include lab-based evidence on transmission; patient-centred aspect of care; healthcare worker-centred aspects; and institutional governance. While results varied on the presence of SARS-CoV-2 in ocular tissues and there is little consensus on whether the phacoemulsification procedure is aerosol-generating, most publications agree that with appropriate precautions, the surgical procedure does not considerably increase transmission risks. Reviewed literature showed that although psychological distress of contracting COVID-19 during surgery was significant, especially as most patients are high-risk elderlies, majority of patients were willing to undergo cataract surgery to improve their quality of life. Negative impact in the surgical training of ophthalmologists, potential ethical and liability dilemma in the prioritising cases were cited as other repercussion of cataract surgery service suspension.

Conclusions: The protracted course of the COVID-19 pandemic means that healthcare provision must function under a new normal, and adoption of safety precautions were widely suggested in literature to safely continue cataract surgery during the pandemic. On an institutional level, a significant case backlog and longer waiting time would result from a prolonged ongoing suspension of cataract surgery, leading to worsened patient quality of life and a heavy societal cost.

Implementation and feasibility of control measures in schools during the COVID-19 pandemic

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Introduction: Prior to COVID-19, school-related mitigation measures in response to infectious disease epidemics and pandemics were focused on school closure and dismissal, however these measures cause substantial social and economic impact. Reopening of schools during the COVID-19 pandemic provided an opportunity to gain understanding on other less disruptive school-based measures. We aim to study the extent of implementation and feasibility of possible school measures, subsequently utilize these information to generate a short list of feasible measures that should be prioritized for further investigation.

Method: A cross-sectional survey was conducted in August-November 2020. All kindergartens, primary and secondary schools in Hong Kong were invited via email to fill-out an electronic survey. The survey contained two major sections: (i) implementation, schools reported whether each measure in a long list of possible school measures was implemented during the school resumption period of May 27 – July 12 2020; (ii) feasibility, schools rated the difficulty level to implement selected measures for the entire academic semester of September 2020 – January 2021. Implementation and feasibility of school measures were compared across curricula stage.

Results: Surveys returned by 90 schools were included in the analysis, representing ~5% schools in Hong Kong. A wide-range of distancing, personal protective, and other measures were implemented during school resumption. All schools adopted multi-layer measures (mean 26 out of the 43 measures inquired). There were no significant difference in the implementation of majority measures across curricula stage. The most feasible measure was mandatory masking (95.5% schools reporting feasible), while reducing class size was least feasible (23.6%). There were no significant difference in the feasibility of measures across curricula stage, except for reducing class size and ensuring sufficient desk distancing ($p=0.03$ for both measures).

Conclusion: Based on schools' practice and perceived feasibility, measures which should be prioritized for further investigation are: masking for all staff and students, cancel activities which facilitate crowding, reduce group discussions/group work in class, and ensure sufficient distancing between staff and students during in-class teaching. Primary schools consistently reported lower feasibility for several measures as compared to kindergarten or secondary schools, suggesting possible need for more support.

The effect of a comprehensive health education programme for communicable diseases prevention in primary school setting on absenteeism in flu season: a randomized waitlist-controlled trial

Purpose: Determine the effect of a comprehensive health education programme for communicable diseases (CDs) prevention on student absenteeism.

Methods: A health education programme for common CDs prevention highlights most of the hygiene practices in an attractive format designed for young children (grade 1-3). Face-to-face health education sessions in the programme covering introduction of CDs, the mode of transmission, hand hygiene technique, cough and sneeze etiquette, and fitting surgical masks technique. Besides, leaflets, stickers, badges, videos, hand washing reminder signages and proper hand washing skill posters are provided for schools after the session.
This was cluster randomized waitlist-controlled trial among intervention before (Semester 1) or after (Semester 2) the influenza season in 2018/19 academic year. Aggregated anonymous student absenteeism were obtained from schools retrospectively. The absenteeism was analysed by negative binomial regression model in R, including terms specifying 2 groups of school (intervention in semester 1 and 2); different time periods (pre-season, season and post-season); and interaction between groups and time periods.

Results: A total of 34,321 students from 53 local primary schools were enrolled. Among which 25 schools (18,646 students) were having programme in semester 1 and 28 schools (15,675 students) having programme in semester 2 in 2018/19. There is no significant difference between 2 groups of school due to the RCT study design. In the local influenza season, from 2 January 2019 to 4 April 2019 according to Center of Health Protection, schools having intervention before influenza season was associated with a lower absence incidence rate ratio (IRR), of 9% (IRR 0.91, 95% CI 0.86, 0.97), comparing to schools having intervention after season.
On stratification by grade, this effect of lowered absenteeism increased to 23% (IRR 0. 77, 95% CI 0.70, 0.85) in grade 1-3 students, showing the higher direct impact for younger students whom were participated the face-to-face session. On the other hand, no significant impact on the absence rate for students in grade 4-6, who were not directly participated in the health education sessions.

Conclusions: The comprehensive health education programme for CDs prevention is effective in reducing student absence rate among primary school students in Hong Kong.

Is Social Capital Associated with Health through Perceived Stress Coping Ability? A Mediation Analysis among Chinese Adults

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Background: Although studies showed positive associations between social capital and health, less is known about the pathways of the association in China. We examined whether perceived stress coping ability mediated the association between social capital and health among Chinese adults.

Methods: Participants were 3,503 Chinese adults (> 18 years) (rural: 1,458; urban: 2,045) from the 2010 nationally representative cross-sectional Chinese General Social Survey. Health outcome was a factor score constructed by three health items. Perceived stress coping ability was a factor score based on three items from the Perceived Stress Scale. We measured social capital by frequency of socializing, civic participation (i.e., voting in neighborhood committee elections), and trust.

Results: Multivariable linear regression models showed that higher levels of frequency of socializing were associated with better health in both rural (β (95% CI) compared with "Never": Sometimes — 0.22 (0.05 to 0.39); Often/Always — 0.30 (0.11 to 0.49)) and urban areas (β (95% CI) compared with "Never": Seldom — 0.18 (0.03 to 0.33); Sometimes — 0.22 (0.08 to 0.37); Often/Always — 0.29 (0.13-0.44)). Higher levels of trust were also associated with better health in both rural (β (95% CI) compared with "Strongly distrust/Distrust": Trust — 0.13 (0.00-0.26); Strong trust — 0.18 (0.01-0.35)) and urban areas (β (95% CI) compared with "Strongly distrust/Distrust": Trust — 0.14 (0.05 to 0.23); Strong trust — 0.18 (0.03 to 0.32)). Mediation analyses indicated that perceived stress coping ability significantly mediated 31.52% and 52.79% of the association between frequency of socializing and health in rural and urban China, respectively. Only in urban but not rural China did perceived stress coping ability significantly mediate 27.27% of the association between trust and health.

Conclusion: Social capital is associated with health partially through perceived stress coping ability. Health interventions to improve social capital can target people having poor stress coping abilities.

Impact of restaurant-based measures to control community transmission of COVID-19, Hong Kong

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Introduction: In order to curb the local spread of COVID-19 in Hong Kong, the government applied a combination of public health and social measures (PHSMs) including bar closures, restricted headcount and opening hours of restaurants, bans on live music performances and dancing, and work-from-home advisories. Continuously evaluating the impact of these PHSMs on transmission is critical to inform future control strategy. Previous literature has suggested that restaurants are considered to pose a risk in COVID-19 transmission. We aim to examine the effectiveness of restaurant measures in Hong Kong.

Methods: We obtained the information on implementation periods of all PHSMs applied during the third and fourth waves from the Hong Kong government. We estimated the transmissibility by measuring the effective reproduction number (Rt) for COVID-19. Lasso regression models were fitted to log(Rt) to determine the impact of ban on dine-in services from 6pm on transmissibility over time, given that other PHSMs were in place. We allowed a time lag of 7 days in the change in transmissibility following introduction of a PHSM.

Results: Ban on dine-in services after 6pm did not show an effect on change in Rt in both waves, but implementation of at least three other PHSMs was significantly associated with a 53% (95% CI 44%-59%) reduction and 40% (95% CI 28%-47%) reduction in Rt in Waves 3 and 4 respectively. Similar results were found in the alternative model excluding basic civil service arrangement from other PHSMs. In the sensitivity analysis of removing the superspreading effect in the early phase of Wave 3, implementation of at least three other PHSMs was associated with a 47% (95% CI 37%-54%) and 33% (95% CI 19%-42%) Rt reduction in Waves 3 and 4 respectively.

Conclusions: Shortening dine-in operating hours of restaurants might not play a part in reducing local transmissibility. Meanwhile, other PHSMs were found to have a considerable effect on suppressing the incidence of the third and fourth waves. Impact assessment of alternative PHSMs would be critical to mitigate further resurgences of cases.

Urinary sodium with type 2 diabetes and its risk factors: a two-sample mendelian randomization

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Background and Objectives: Previous observational studies have found limited causal associations between urinary sodium (UNa) and Type 2 diabetes mellitus (T2DM). The aim of this two-sample Mendelian Randomization (MR) study was to examine the causal association between UNa and T2DM with and without adjustment of body mass index (BMI) and estimated glomerular filtration rate (eGFR).

Methods: We performed a two-sample Mendelian Randomization study of UNa and T2DM adjusted and unadjusted for BMI and eGFR, with a total sample size of 898,130 in the European-ancestry population. Genome-wide association studies (GWAS) of UNa, T2DM, BMI, and eGFR were identified. We initially extracted 50 single nucleotide polymorphisms (SNPs) associated with UNa at a significance level of 5 × 10^-8. Univariable and multivariable MR with and without adjustment of BMI and eGFR were performed. Inverse-variance weighted MR was performed as the primary analysis, weighted median method, and MR-Egger regression method as sensitivity analysis. The effect measure was interpreted as odds ratio and its 95% confidence interval (CI).

Results: In the univariable MR, UNa had significant positive causal effects on T2DM in both GWAS of Mahajan's [OR (95% CI): 2.659 (1.174, 6.032)] and Scott's [OR (95% CI): 3.047 (1.274, 7.286)]. UNa showed an independent positive causal association with T2DM after adjusting for eGFR in both GWAS of Mahajan's [OR (95% CI): 1.659 (1.070, 2.568)] and Scott's [OR (95% CI): 2.111 (1.305, 3.411)]. There was no significant positive causal effect between UNa and T2DM with adjustment of BMI, and with adjustment of both BMI and eGFR.

Conclusion: UNa indicated the risk of T2DM. Dietary salt intake increased the morbidity of T2DM. Reduction of dietary sodium intake should be considered included in the further clinical practice guidelines in T2DM prevention.

Factors associated with uptake of screening for lung cancer in Hong Kong

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Background: Lung cancer remains to be the leading cause of cancer-related deaths globally and in China. Lung cancer screening by low-dose computed tomography has been recommended in asymptomatic Chinese smokers. We investigated their participation rate and factors associated with screening uptake in a Chinese population.

Methods: Data from 3,600 participants aged 61-70 were collected through telephone surveys by simple random sampling of telephone numbers in a territory-wide directory (from 2016 to 2018, Hong Kong SAR China). Smoking history, sociodemographic information, and other health-related factors were collected. A binary logistic regression model was constructed to identify the association between these factors and uptake of lung cancer screening.

Findings: The proportion of smokers among the participants was 10.8% (95% CI=9.8%-11.8%, n=387). The participation rate of lung cancer screening was 20.7 % (16.7%-25.1%, 80) among smokers vs. 22.1% (20.7%-23.6%, 711) among non-smokers. Among all study participants, individuals with higher education level (primary: referent; secondary: adjusted odds ratio (AOR)=1.32, 1.05- 1.66, p=0.018; tertiary: 2.31, 1.89-2.81, p<0.001), subjects who were retired (employed: reference; retired: 1.79, 1.23-2.28, p=0.001), and those with higher monthly income (HKD<10,000: referent; HKD>20,000: 1.31, 1.04-1.66, p=0.022) were more likely to join lung cancer screening. However, smoking history, age, gender, marital status, and self-perceived were not associated with screening participation.

Interpretation: The participation rate of lung cancer screening remained suboptimal among Chinese smokers. Our findings suggested that educational level, monthly household income, and working status, but not smoking history, were associated with uptake of lung cancer screening. These individuals represent population groups where more focused promotion of screening programmes should be targeted.

Spatial impact on temperature and mortality relationship in subtropical metropolis, Hong Kong

Zhe Huang, Emily Ying Yang Chan, Benny Chun Ying Zee

Background: Climate change has caused major health impacts in urban context. In subtropical context such as Hong Kong, most of the existing published studies assessed the overall health impact of temperature in Hong Kong by using one station or multiple station averaged meteorological and air quality data. Limited studies have critically examined the underlying assumption of “spatial homogeneity” can truly represent the variation on spatial impact on temperature-mortality relationships in city context. This study aims at investigating whether the health impact is modified by local temperature and other meteorological, air quality and environmental factors of small geographic units.

Methods: Data on meteorological, pollutants, and mortality count in Hong Kong during 2006 to 2016 were obtained from the Hong Kong Observatory, Environmental Protection Department, and Census and Statistics Department, respectively. The effects of local temperature on non-accidental and cause-specific mortality were analyzed using Bayesian spatial models at small area level, adjusting for the potential confounders, i.e., area-level air pollutants, socioeconomic status, and green space, as well as spatial dependency.

Results: Findings indicated 10% increase in green space density was associated with an estimated 4.8% decrease in non-accidental mortality risk in Hong Kong, but according to the findings, the variation of local annual temperature did not significantly contribute to the mortality.

Conclusion: Previous studies indicated that the daily fluctuation of mortality was associated with daily temperature when the whole territory of Hong Kong was taken as spatially uniform, while this study found that the spatial variation of mortality within this city could be explained by the geographical distribution of green space and socioeconomic factors, but not local temperature nor air pollution.

Population adherence to infection control behaviors during Hong Kong's first and third COVID-19 wave: A serial cross-sectional population study

Zhe Huang, Emily Ying Yang Chan, Jean H Kim, Kevin Kei Ching Hung, Kin On Kwok, Eric Kam Pui Lee, Eliza Lai Yi Wong, Samuel Yeung Shan Wong, Caroline Dubois, Sida Liu

Background and Aims: Since the beginning of the worldwide pandemic, COVID-19 has affected over 220 countries around the world. There is limited research examining the predictors of adherence with infection control measures over time, particularly in a region with previous pandemic experience. Our study examines the changes in the adoption of self-reported protective behaviors in Hong Kong during in the early part of the first wave and much larger third wave. This study examines the sociodemographic groups at high risk of non-compliance at each time point.

Methods: A serial cross-sectional population telephone survey was conducted in the first wave of the local pandemic between 22 March to 1 April 2020 (n=765), and during the third wave between 15-29 December 2020 (n=651). Respondents were asked about their level of compliance with various personal hygiene and social distancing recommendations. Ethics approval was received from CUHK.

Results: In addition to socio-demographic predictors of various community behavior patterns, study findings showed personal hygiene preventive measures adoption against COVID-19 in Hong Kong remained high over nine months. Yet when compared with earlier survey (March and April 2020), changes in social distancing measures adoption were observed. The study findings agree with previous studies that the low adherence may be partly related to job demand.

Conclusion: In order to encourage population compliance with infection control measures in early and later stages of pandemics. Personal hygiene and disinfection measures should be emphasized, especially in the workplace and public transport. Health education programs aimed at improving COVID-19 knowledge should target the working population through active and relevant health communication methods and channels.

Mortality and Socioeconomic Vulnerability assessment model for community health protection planning in Hong Kong

Zhe Huang, Emily Ying Yang Chan, Benny Chun Ying Zee

Background: Urban resilience to extreme events such as heat wave, typhoon and biological hazard is found to be associated with individual health risks and its associated social vulnerability. Currently, there are limited technical tools to consider how health risks may contribute to socioeconomic vulnerability and the spatial implication on multi-dimensional socioeconomic vulnerability in urban context. Based on mathematical modelling of existing data, a vulnerability assessment scheme was proposed to guide decision-making in disaster resilience and sustainable urban development.

Methods: A two-stage approach was applied to Hong Kong to identify population subgroups among all the Tertiary Planning Units (TPU) (i.e., the small geographic areas) with similar characteristics. In stage 1, Principal Components Analysis was used for dimension reduction and denoising the socioeconomic data for each TPU based on the variables selected, while in stage 2, Gaussian Mixture Model was used to partition all the TPUs into different subgroups based on the results of stage 1.

Results: The proposed model summarized socioeconomic vulnerability-related data into five principal components, including indigenous degree, family resilience, individual productivity, populous grassroots and young age. According to these five principal components, all TPUs were clustered into five sub-groups/clusters. Testing on model reliability and usefulness of the principal components were conducted using log-mortality rate comparison across different sub-regions in 2016. A simple correlation analysis was conducted between the log-mortality rate and the five principal component scores. Positive relationship between the log-mortality rate and the populous grassroots principal component ($r=0.44$, $p<0.001$) were found, but a negative relationship between log-mortality rate and the young-age principal component ($r=-0.37$, $p<0.001$). When these two principal components were put into multiple linear regression, the updated model had an adjusted $R2$ of 32.2%. The coefficients of both of the principal components were highly statistically significant.

Conclusions: Socioeconomic vulnerability is a concept that could be used to help identify areas susceptible to health risk, and even identify susceptible vulnerable groups in affluent areas. Areas with high populous grassroots score and low young-age score should be paid more attention since they were correlated with higher mortality rate.

Association between working conditions and self-management behaviours of people with type 2 diabetes

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Purpose: This study aimed to examine the relationship between working conditions and the diabetes self-management behaviours of maintaining healthy diet, performing physical activities and self-monitoring of blood glucose (SMBG).

Methods: This was a cross-sectional survey study of employed people with type 2 diabetes aged between 18 and 65 (n = 185). Participants were selected by simple random sampling from the appointment list of the Fanling Family Medicine Centre in Hong Kong, who provided primary data through self-administered questionnaires. Psychosocial working conditions and diabetes self-management behaviours were measured by the Chinese version of the Job Content Questionnaire and the Chinese version of the Summary of Diabetes Self-Care Activities respectively, supplemented by individual questions. ANOVA test, Spearman's rank correlation and Fisher's exact test were used for preliminary assessment, with univariate regression, multivariable binary logistic regression and hierarchical multiple linear regression further conducted to examine the association between specific self-management behaviours and the corresponding working conditions, with potential confounders adjusted.

Results: For adherence to healthy diet, participants with mobile work location (Fisher's exact test ($p<0.001$), with $\phi=0.307$) or higher job psychological demand (adjusted odds ratio of 1.22 (95% CI=1.02-1.46)) were more likely to consume restaurant-prepared meals (RPM). For physical activities, job security level could explain variance of days with at least 30 minutes of physical activities ($R2=0.172$, $F(11, 172)=3.250$, $p<0.001$; adjusted $R2=0.119$). For SMBG, no significant association was found with the working conditions studied (availability of private space and disclosure of diabetes to supervisor).

Conclusions: The findings demonstrated that psychosocial working conditions were associated with specific diabetes self-management behaviours of employed type 2 patients. Healthcare professionals might better understand the self-management behaviours of employed type 2 diabetes patients with information on the relevant working conditions. As RPM was found to be associated with higher energy, higher fat and higher sodium intake in previous literature, healthcare professionals might consider equipping employed type 2 diabetes patients with the skills to maintain healthy diet while eating out, particularly those with mobile work location or higher job psychological demand. For patients with low job security, diabetes self-management health advice might focus on facilitating physical activities.

The relationship between consumption of home-prepared meals during work hours and glycaemic control of employed persons with type 2 diabetes

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Purpose: This study aimed to examine if consumption of home-prepared meals (HPM) during work hours was associated with better glycaemic control of employed persons with type 2 diabetes, given the growing trend of eating out and its association with unhealthy diets.

Methods: A cross-sectional survey study of employed people with type 2 diabetes aged between 18 and 65 (n = 185). Participants were selected by simple random sampling from the appointment list of the Fanling Family Medicine Centre (FLFMC) in Hong Kong, who through self-administered questionnaires provided primary data on demographic, socioeconomic and lifestyle factors, disease conditions, source of meal during work hours; and consented to have their electronic HbA1c records accessed through the FLFMC database. HbA1c levels of participants consuming HPM and restaurant-prepared meals (RPM) during work hours were first compared using Mann-Whitney U test. Hierarchical multiple linear regression was further conducted to examine the association between source of meal during work hours and HbA1c level, with potential confounders adjusted.

Results: Statistically significant differences in HbA1c level were found between participants who consumed HPM and those consuming RPM during work hours ($U= 1945$, $z = -3.036$, $p=0.002$), with HPM associated with lower HbA1c. Furthermore, consumption of HPM during working hours could explain variance of HbA1c ($R2 = 0.146$, $F(13, 171) = 2.248$, $p=0.010$; adjusted $R2 = 0.081$), independent of socio-demographic factors, lifestyle factors and disease condition, with consumption of HPM during work hours associated with lower HbA1c level for employed persons with type 2 diabetes.

Conclusions: This is the first study to examine HPM consumption during work hours in relation to HbA1c level among employed person with type 2 diabetes. Consumption of HPM could be considered as a possible way to facilitate better glycaemic control by type 2 diabetes patients with employment, possibly through more practical dietary advice (e.g., providing recipe or packed lunch ideas that are easy to prepare), and workplace accommodation (e.g., in terms of space and storage/ reheating facilities). In the context of COVID-19 pandemic, consumption of HPM might also mean additional protection for people with diabetes through reducing close contact exposures in restaurants.

Health care utilization and economic costs in the early stages of cognitive impairment and dementia in Hong Kong

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Purpose: To estimate the service utilization and economic costs among individuals with early stages of cognitive impairment and dementia in Hong Kong.

Methods: The cost-of-illness (COI) study was based on a population-based, two-phase, epidemiological study, involving over 3,000 community-dwelling adults aged ≥60 in Hong Kong. The COI survey was conducted for participants screened positive for cognitive impairment in the phase-one survey and completing the diagnostic workup in the phase-two interview. Participants were categorized into three categories based on the Clinical Dementia Rating (CDR) scale: normal cognition (NC) (CDR=0), mild cognitive impairment (MCI) (CDR=0.5), and mild dementia (CDR=1). Service utilization of health care, social care, and informal care was collected by the adapted version of Resource Utilization of Dementia (RUD) questionnaire. Unit costs were retrieved from the price lists and statistical data from public sectors. The total cost per participant per year was estimated based on the bottom-up approach from societal perspectives in 2020 US dollars. Differences in costs between different stages of cognitive impairment were examined by two-part regression models after adjusting for age, gender, income, education, and comorbidity.

Results: Up to November 2020, 107 participants (mean age: 73; female: 58%) completed the COI survey, of which 19 had NC, 67 had MCI, and 21 had mild dementia. Participants with mild dementia utilized more day care, and informal care on instrumental daily activity and supervision, than those with MCI and NC. The societal costs associated with mild dementia (US$5,346 or HK$41,123, P=0.003) and MCI (US$4,681 or HK$36,008 per year, P=0.007) were significantly higher than those of NC (US$1,722 or HK$13,246), after adjusting for other factors. The attribution of non-medical care in total cost also increased with more severe stages of cognitive impairment (NC: 33%, MCI: 51%, mild dementia: 63%).

Conclusions: Even in the early stages of cognitive impairment and dementia, the disease burden and economic costs can be largely different from those of normal cognition, especially in greater demands on daily caregiving. Interventions and support for older adults with early stages of cognitive impairment as well as their caregivers are needed and can have a significant importance.

Impact of COVID-19 pandemic on physical activity levels among Hong Kong older adult

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Purpose of the study: To determine the impact of COVID-19 panademic on the levels of physical activity and actigraphy-measured rest-activity circadian rhythm among Hong Kong older adults.

Methods: We conducted population-based cross-sectional study with three times of repeated measurements, and recruited 242 community older men aged >60 years in three periods of the COVID-19 outbreak in Hong Kong [pre COVID-19 (2 July 2019-8 January 2020), between the 2nd and 3rd waves of COVID-19 (23 June 2020-9 July 2020), and during the 3rd wave of COVID-19 (15 September 2020-29 September 2020)]. We used International Physical Activity Questionnaire to collect detailed information on participants' physical activity habits and transformed it into metabolic equivalent (MET), meanwhile we invited them to wear actigraphs continuously for 168 hours (7days). A gravity-subtracted sum of vector magnitudes (SVM) was automatically calculated with actigraph data, and we used the Chronos-Fit program to transfer the SVM data to four rest-activity circadian rhythm parameters: midline statistic of rhythm (MESOR), amplitude, acrophase and percent rhythm. We used multivariate logistic regression to estimate the association of different COVID-19 period with physical activity and rest-activity circadian rhythm parameters.

Results: We recruited 106 (43.8%) of community older men before the COVID-19 outbreak, 66 (27.3%) between the 2nd and 3rd waves of COVID-19, and 70 (28.9%) during the late phase of the 3rd wave of COVID-19. Participants recruited between the 2nd and 3rd waves of COVID-19 had lower MET (adjusted odds ratio(AOR)=2.03, 95% confidence interval (95%CI) =1.05-3.93), MESOR (AOR=2.05, 95%CI=1.01-4.18), and amplitude (AOR=1.91, 95%CI=0.95-3.83) than

those recruited before COVID-19. We did not obserave any significant difference in physical activity or circadian rhythm parameters between subjects recruited pre and during the late phase of the 3rd wave.

Conclusions: We found that the impact of COVID-19 on physical activity levels and rest-activity circadian rhythm for the community population may be short-term, which was resumed to the normal levels during the late phase of the 3rd waves of COVID-19, indicating a strong resilience of the community population.

Acknowledgement: Pneumoconiosis Compensation Fund Board and Pneumoconiosis Mutual Aid Association

Predicting mortality with sepsis scoring systems in: a systematic review and meta-analysis

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Purpose: We conducted a systematic review and meta-analysis to assess the prognostic accuracy of sepsis scoring systems to predict mortality in adult patients with suspected infection.

Methods: PubMed and EMBASE were searched from inception to 14th August 2021 for English full-text studies assessing either the quick Sequential (Sepsis-Related) Organ Failure Assessment (qSOFA), Systematic Inflammatory Response Syndrome (SIRS) criteria, Sequential Organ Failure Assessment (SOFA), and National Early Warning Score (NEWS) / National Early Warning Score 2 (NEWS2). 2*2 contingency tables were constructed from available data to derive Hierarchal Summary Receiving Operator Characteristic (HSROC) plots. Summary estimates of sensitivity, specificity, diagnostic odds ratio, and positive and negative likelihood ratios were calculated.

Results: A total of 35 studies consisting of 449841 patients were included in the meta-analysis. qSOFA was associated with a pooled sensitivity of 55.2% (95% CI [confidence interval], 44.4% to 65.5%) and a pooled specificity of 77.6% (CI, 70.4% to 83.5%). The SIRS criteria was associated with a pooled sensitivity of 86.2% (CI, 79.0% to 91.2%) and a pooled specificity of 28.6% (CI, 20.3% to 38.8%). SOFA was associated with a pooled sensitivity of 94.8% (CI, 89.1% to 97.6%) and a pooled specificity of 33.1% (CI, 15.6% to 57.0%). NEWS/ NEWS2 was associated with a pooled sensitivity of 85.0% (CI, 69.4% to 93.4%) and a pooled specificity of 41.0% (CI, 26.6% to 57.1%).

Conclusion: qSOFA had the poorest sensitivity but highest specificity for predicting short-term mortality among patients with suspected infection. Even though NEWS and the SIRS criteria did not have a high sensitivity as SOFA, they are still preferred for screening of high-risk patients with suspected infection as their assessments can be conducted in a timely manner.

"We need to work very hard to afford (skyrocketing) food cost": Qualitative investigation into the Food Insecurity Risks among Hong Kong low-income families under COVID-19

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Background: The COVID-19 pandemic impacts the availability, accessibility, utilization, and stability of food provision. Preliminary evidence shows that the pandemic disproportionally affects the socio-economically disadvantaged living in urban settings, but limited investigations were conducted in Asia. Using Hong Kong as an example of developed economies in Asia, this study explores factors contributing to the food insecurity risks among low-income families under the pandemic.

Methods: Through a COVID-19 food-aid programme which provided immediate fresh food packs to the needy population, we recruited the major caregivers of low-income Chinses families in Hong Kong with different health statuses (i.e. generally healthy population and people with known chronic conditions) and living in various housing types (i.e. public housing, rental housing, and sub-divided flats) by purposive sampling. Low-income families were defined as those eligible for Working Family Allowance provided by the Hong Kong Social and Welfare Department. All interviews conducted were transcribed verbatim, and thematic analysis was used.

Results: Fifteen in-depth individual interviews were conducted between July and August 2020 during the second wave of the COVID-19 outbreak in Hong Kong. Six risk factors contributing to food insecurity risks were identified, namely: (i) decreased income and socio-economic status, (ii) limited literacy and knowledge for food preparation, (iii) food price inflation, (iv) disrupted physical access to food due to fear of infection and social-distancing measures, (v) existing home environment constraints, and (vi) adult trade-off food portion to feed children.

Conclusion: This study suggests that the pandemic threatened the physical and economic access to food, food instability and utilization among low-income families in Hong Kong, resulting in elevated food insecurity risks. As the pandemic and its impacts on the economic downturn are likely to last for years, urgent actions and measures are warranted to prevent the exacerbation of local food security disparities.

Can preventive vouchers promote the utilisation of preventive services among citizens aged 45-59? A cross-sectional study

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Ageing population has posed immense challenge to Hong Kong's healthcare system. The research aims to explore the views and attitudes on proposed extended Health Care Voucher Scheme (HCVS) as a demand-side tool among middle-aged citizens. HCVS was first introduced in 2009 as a fiscal incentive to promote primary care among elderly. The proposed extended HCVS provides an annual amount of HKD2000, which could only be used on preventive healthcare services, to middle-aged citizens. It is believed that early diagnosis and management would alleviate the burden of chronic diseases posed on healthcare system in the long run.

A cross-sectional survey with self-administered structured questionnaire is adopted and convenience sampling is employed as the major sampling method. We target to recruit 400 subjects, who (1) are Hong Kong permanent residents; (2) understand Chinese; and (3) are aged between 45 and 59. The questionnaire is composed of four major constructs, namely the attitudes on HCVS and health checks, knowledge on HCVS, current utilisation pattern of healthcare services and socio-demographics. Items regarding the attitudes are developed based on the Health Belief Model.

Data collection is under progress and a total of 170 responses have been received. 97.1% of the respondents indicated they would utilise more preventive services than before if they were given preventive vouchers, and more than 90% of them agreed they would use the vouchers on health checks. Respondents also reported that if health check does not incur extra costs under the health insurance purchased by working organization, it is the strongest incentive for attending check-ups. It has reached an average of 3.78 on a 4-point Likert scale.

The preliminary results of the survey suggest majority of the respondents are very likely to utilise more preventive services, especially health checks, if they are provided with vouchers annually. Fiscal incentive is a determining factor contributing to the decision of attending check-ups. Respondents are generally more concerned about chronic diseases with severe complications, for instance colorectal cancer. There is an urge to promote the general awareness of major risk factors and encourage regular health checks, which could be achieved by introducing the extended HCVS.

The effect of mindfulness-based intervention (MBrace) in improving bracing compliance in adolescent idiopathic scoliosis patients: a randomized controlled trial

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Background: Bracing is the primary treatment for AIS patients with immature skeleton and spinal curve between 25°-45°. New evidence implicates bracing compliance significantly decreased the progression of high-risk curves to surgery threshold. Intervention that may improve bracing compliance is of great interest. This study aimed to compare the effectiveness of mindfulness-based intervention (MBrace) versus physiotherapeutic supervised exercise program (PE) on bracing compliance in AIS patients.

Methods: AIS patients between 10 to 15 years who were prescribed brace treatment with non-satisfactory bracing compliance ($\leqq$ 18 hours per day) were recruited at department of orthopedic and traumatology of Prince of Wales Hospital. MBrace program was an adapted shorter version of MBSR to addressing the specific issues of AIS patients. Control group consisted of an 8-week PE program that was recommended according to the SOSORT 2011 guideline. The primary outcome was the 6-month post-intervention bracing compliance (hours/day) which was assessed by sensor monitoring and self-report. Secondary outcomes included quality-of-life measures, self-compassion, emotional regulation, self-efficacy, stress, and mindfulness level. Data were collected at month 0 (baseline), month 2 (end-intervention) and month 8. ANCOVA analysis was conducted to detect the effect of MBI compared with PE intervention. To investigate significant change over time, Linear Mixed Models (LMM) was conducted following the intention-to-treat principle.

Results: 83 AIS patients were recruited and randomized to MBrace (N=45) or PE (N=38). A greater improvement in bracing compliance was found in MBrace group versus controls at month 8 (difference in changes between groups [DD]=1.64h/day, 95%CI: -0.25, 3.53h/day, p-value=0.088), but it only reached statistically significant after exclusion of outliers (DD=2.27h/day, 95%CI: 0.49, 4.05h/day, p-value=0.021). At month 2, a significant estimated treatment effect was detected both with and without exclusion of outliers. In within-group comparisons, the MBrace group showed a significant improvement in cognitive reappraisal and disease-specific quality of life at month 8. However, no significant group effect was observed in the MBrace group versus controls in all secondary outcomes.

Conclusion: Mindfulness-based intervention may be effective at improving bracing compliance in AIS patients with poor bracing compliance. Larger RCTs with longer follow-up time are needed to confirm its long-term effect.

Impact of drug resistant pathogens on mortality in patients with acute exacerbations of COPD: a territory wide study

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Purpose: To investigate the impact of drug resistant pathogens on mortality in patients admitted to hospital with acute exacerbations of COPD (AECOPD) as the primary outcome, and the length of hospital stay (LOS), ICU admission and hospital readmission interval for the next AECOPD as the secondary outcomes.

Methods: We conducted a retrospective territory wide study, recruiting patients admitted for AECOPD across all hospitals in Hong Kong from December 2018 to December 2019, using the Clinical Data Analysis and Reporting System (CDARS). Pathogens, instead of commensals, were assessed and defined as: Enterobacter aerogenes (EA), Enterobacter cloacae complex (ECC), Enterobacter species (ES), Pseudomonas aeruginosa (PA), Moraxella catarrhalis (MC) and Streptococcus pneumoniae (SP), as identified through a detailed literature search. Patients with positive sputum cultures of these pathogens >106 colony forming units (cfu)/ml were included.

Results: A total of 1671 patients were identified and stratified to 4 groups: Group 1 being patients with no drug resistant pathogens (n=747), Group 2 resistant to 1 drug (n=553), Group 3 resistant to 2 (n=148), and Group 4 resistant to 3 or more drugs (n=223). LOS and mortality showed statistically significant differences between the groups ($p<0.001$ for both), with major differences presented in Group 4, having a median LOS of 8.00 days [IQR 3.00, 22.00] and mortality rate of 17.5%, compared to 5.00 days [IQR 3.00, 10.00] and 8.6% in Group 1. Multivariate analysis revealed having a drug resistance level of >2 being an independent risk factor for mortality (odds ratio (OR) of 2.50 [95% confidence interval (CI) 1.49-4.09], $p<0.001$), when compared to Group 1 with no drug resistance. MC and SP were associated with lower mortality (OR=0.27 [95% CI 0.11-0.58], $p=0.0024$, and 0.16 [95% CI 0.06-0.37], $p<0.001$ respectively). Kaplan Meier curve showed a log rank value of $p=0.00015$, revealing significant differences in 30-day survival time between the groups.

Conclusions: Drug resistance is associated with worse clinical outcomes in AECOPD, in particular for mortality and LOS. We plan to conduct randomized controlled trials (RCTs) regarding the prevention of drug resistance through point-of-care C-reactive protein (CRP) guided antibiotic stewardship for AECOPD in the coming months.

Impact of drug resistant pathogens on mortality in patients with acute exacerbations of COPD: a territory wide study

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Background: Hong Kong have invested heavily in hospital infection control and pandemic preparedness after the Severe Acute Respiratory Syndrome (SARS) epidemic in 2003. The healthcare infrastructure developed by this investment had appeared to be successful in limiting nosocomial transmission during the current COVID-19 pandemic, with healthcare workers making up a relatively low proportion of COVID-19 cases in Hong Kong. As asymptomatic cases of SARS-CoV-2 infections can be missed, seroprevalence studies can provide further information of the cumulative incidence of the infection in the community as well as among HCWs.

Methods: We conducted an observational cohort study of 761 healthcare workers with varying exposures to COVID-19 patients and collected blood samples between June and October 2020 to estimate the seroprevalence of COVID-19 in HCWs in Hong Kong. Seroprevalence was defined as the proportion of blood samples that were positive for antibodies against the SARS-CoV-2 virus measured by the plaque reduction neutralization test (PRNT).

Results: The median age of our cohort was 34 years (range: 21, 65), and 35% were male. Most HCWs in our study worked in public hospitals and clinics, and more than half of them worked in clinical departments. Almost all (751) participants in our cohort reported at least occasional contact with patients or potentially contaminated areas in the workplace, and 318 (42%) had reported occupational exposure to at least one COVID-19 case since January 1, 2020. Despite heavy exposure to the SARS-CoV-2 virus, only 18 (2.4%) serum samples were positive by enzyme-linked immunosorbent assay (ELISA) and none of the blood samples were seropositive for antibodies to the SARS-CoV-2 virus by plaque reduction neutralization assay (PRNT). As our study has found no samples that were seropositive by PRNT, we have found no evidence of previous infections among the 761 HCWs in our cohort, translating into an estimated seroprevalence of 0% (95% CI: 0%, 0.5%) for the first 10 months of the pandemic.

Conclusion: Despite significant community spread of COVID-19 in Hong Kong, seroprevalence among healthcare workers in Hong Kong is low. Our findings support the effectiveness of infection control precautions in healthcare workers locally.

Integrated care for multimorbidity population in Asian countries: a scoping review

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Background: The complex needs of patients with multiple chronic diseases call for integrated care. This scoping review aims to identify IC programmes and their relevant components and elements for multimorbidity in Asian countries.

Method: A scoping review was conducted searching electronic databases encompassing Medline, Embase, Scopus, and Web of Science. Three key concepts – 1) integrated care, 2) multimorbidity, and 3) Asian countries – were used to define searching strategies. Studies were included if an IC programme in Asia for multimorbidity was described or evaluated. Data extraction for IC components and elements was carried out by adopting the SELFIE framework.

Results: This review yielded 1,112 articles, of which 156 remained after title and abstract screening and 27 studies after full-text screening – with 23 IC programmes identified from seven Asian countries. The top 5 mentioned IC components were “service delivery” (n=23), “workforce” (n=23), “leadership and governance” (n=23), “monitoring” (n=15), and “environment” (n=14); whist “financing” (n=9) was least mentioned. Compared to EU/US countries, “technology and medical products” (Asia: 40%, EU/US: 43%-100%) and “multidisciplinary team” (Asia: 26%, EU/US: 50%-81%) were reported less in Asia. Most programmes involved more micro-level elements that coordinate services at individual level (n=20), and programmes were mostly found incorporating horizontal and vertical integration (n=14).

Conclusion: In the IC programmes for patients with multimorbidity in Asia, “service delivery”, “leadership, and workforce” were most frequently mentioned, while “financing” was least mentioned.

Viral shedding dynamics in symptomatic COVID-19 patients

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Introduction: Viral load has been used to indicate the infectiousness and progression of infections with respiratory viruses. While viral shedding and transmission risk of SARS-CoV-2 have been examined in some studies, the potential association between viral shedding and the clinical outcome of SARS-CoV-2 infections remained unclear.

Purpose: To construct viral shedding profiles of COVID-19 patients and to explore the association between SARS-CoV-2 viral shedding and the clinical severity of COVID-19 cases.

Methods: We obtained hospital admission data of all laboratory-confirmed COVID-19 cases in Hong Kong from the Hospital Authority (HA). Cycle threshold (Ct) values as a semi-quantitative measure for viral load were reported based on results of reverse transcription polymerase chain reaction tests and were used to construct viral shedding profiles for symptomatic COVID-19 cases. Daily Ct values after onset were estimated by random effects model taking into account patients' characteristics. Logistic regression analysis was conducted to examine the association between infection severity and duration of viral shedding with age group, sex and underlying conditions included as covariates.

Results: The estimated viral load decreased significantly after onset in the majority of the cases with mild-to-moderate infection, while most severe cases showed a persistently higher viral load in the first 1-9 days after onset. The median duration of effective viral shedding after onset was 13 days (interquartile: 10-16 days) and 16 days (interquartile: 12-19 days) for mild-to-moderate and severe cases respectively, while it could be even longer for the most severe group. Longer shedding duration was independently associated with severe COVID-19 (adjusted Odds Ratio = 1.17, 95% confidence interval: 1.15-1.20).

Conclusions: SARS-CoV-2 viral shedding profiles varied across patient groups with different severity status. A slower decline in viral load was associated with more severe infection among symptomatic COVID-19 cases.

Comparison of Health-related Quality of Life Derived by EQ-5D in Hong Kong Year 2014 and 2020

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Background: EQ-5D has been a popular Health-related Quality of Life (HRQoL) utility system due to its multi-attribute nature and its user-friendliness. Validated in Hong Kong, EQ-5D data can be translated into utility values, profiling the HRQoL of Hong Kong citizens. However, as citizens were alarmed by the COVID-19 pandemic in 2020, the EQ-5D attributes and utility value set derived in 2014 may not be felicitous reflections of HRQoL in such circumstances.

Purpose: The study aims to explore if the current EQ-5D-5L utility value set and the dimensions included in the EQ-5D instrument can reflect individual-perceived HRQoL of Hong Kong citizens accurately.

Methods: A randomized telephone survey of the Hong Kong general population was carried out in July 2020 and a total of 510 successful cases was recruited. EQ-5D responses were collected and the participants were also asked if any potential bolt-on HRQoL dimensions (s) would enrich the current EQ-5D instrument to illustrate their HRQoL more comprehensively. The data collected were then compared to the EQ-5D normative profile data collected in 2014.

Results: On a scale of 0-100, the mean individual-perceived HRQoL derived by Visual Analog Scale (VAS) were 82.7 and 75.5 in 2014 and 2020 respectively. Despite the significant decrease observed in the VAS data (p-value< .001), the mean EQ-5D derived utility value did not demonstrate similar trend as the difference between 0.919 and 0.923 in 2014 and 2020 was not statistically significant. (p-value=.45) There were significantly more respondents reporting problems in Self-Care (p-value<.001) and Usual Activities (p-value<.001), while less respondents stating problems in Pain/Discomfort (p-value<.001) and Depression/Anxiety(p-value<.001) in 2020. Considering the potential bolt-on items, appetite (94.5%), hearing (93.1%), vision (92.9%), energy/sleeping quality(90.6%) were highly supported by respondents to include as extra dimension(s) in EQ-5D to better illustrate HRQoL.

Conclusions: The gap observed between EQ-5D utility value sets and individual perceived HRQoL may hint the importance of updating the EQ-5D instrument and corresponding value set in a timely manner. Further research should be conducted to improve the comprehensiveness and accuracy of the EQ-5D to enhance the quality of HRQoL calculations.

The Effect of economics-based incentives on glycaemic control for newly diagnosed type 2 diabetes: a pilot randomised controlled trial

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Purpose: To demonstrate proof-of-concept of behavioural economics-based interventions to improve lifestyle and health outcomes among adults newly diagnosed with type 2 diabetes.

Methods: We conducted a two-arm pilot parallel assessor-blinded randomised controlled trial at two sites in Hong Kong from November 2020 to planned December 2021 (planned end date). Eligible participants aged 30-70 with newly diagnosed type 2 diabetes, drug-naïve, and with glycated haemoglobin (HbA1c) 6.5%-7.5% at enrolment were randomly assigned in a 3:1 ratio to intervention (in addition to standard care) and control (standard care alone) groups. The intervention to improve lifestyle and physical activity was a financial incentive framed around loss aversion and the endowment effect. Primary outcome was change in HbA1c at 6-months compared to baseline. We present preliminary results after half of participants completed the follow-up. Clinicaltrials.gov: NCT04443842.

Results: Among 11 randomised participants aged 54 to 68 (mean 61, SD 3.9), 36.4% were female. Mean HbA1c at baseline were higher in intervention (n=8) than control group (n=3), 7.1% (SD 0.6) vs 6.4% (SD 0.1). Five participants completed 6-month follow-up, with HbA1c declining by 2.7% (-0.2 percentage points), 1.5% (-0.1 percentage points), 1.5% (-0.1 percentage points), 0% and 0%.

Conclusions: Preliminary results of this pilot study demonstrated the feasibility of economics-based incentives to improve glycaemic control among drug-naïve people with type 2 diabetes. A full-scale trial is underway to assess the impact of incentives on physical activity, HbA1c and other health outcomes.

Associations of delay in doctor consultation with COVID-19 related fear, attention to information, and fact-checking

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Objective: Delaying doctor consultation is harmful. We examined the associations of delay in doctor consultation amidst the pandemic with sociodemographic characteristics, COVID-19 related fear, attention to information, and fact-checking.

Methods: We conducted a population-based online cross-sectional survey in May 2020 on Hong Kong Chinese adults. Respondents reported whether the pandemic caused any delay in doctor consultation (yes/no), level of COVID-19 related fear, attention to information and fact-checking (all on a scale of 0 to 10). Regression analyses were used to examine the associations of delay and fear with sociodemographic characteristics, attention and fact-checking, adjusting for covariates.

Results: Of 4551 respondents (46.5% male, 59.7% aged over 45 years), 10.1% reported delay in doctor consultation. The mean score was 6.4 for fear, 8.0 for attention and 7.4 for fact-checking. Delay was more common in males and increased with age and fear. More respondents with a high level of fear reported delay than those with a low level of fear [adjusted odd ratios (AOR), 95% confidence interval (CI): 2.68 (2.08, 3.47)]. More respondents with a moderate level of attention reported delay than those with a low level of attention [AOR (95% CI): 1.28 (0.98, 1.67)]. Fewer respondents with a moderate or high level of fact-checking reported delay than those with a low level of fact-checking [AOR (95% CI): 0.72 (0.56, 0.92) and 0.78 (0.60, 1.02), respectively].
Females reported greater fear and fear decreased with age. Fear also increased with attention to information and decreased with fact-checking. Fear substantially mediated the association of delay with attention (96%) and fact-checking (30%).

Conclusion: We have first shown that delay in doctor consultation increased with fear of COVID-19 and decreased with fact-checking amidst the pandemic. Fear also increased with attention to COVID-19 related information and decreased with fact-checking. If causal, fact-checking may reduce delay in doctor consultation and fear. Understanding these associations can help policymakers develop targeted communication and support to the public to reduce delayed doctor consultations and the associated COVID-19-related or unrelated morbidity and mortality in the community.

Employment Conditions and Health among Female Foreign Domestic Workers in Hong Kong

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Introduction: Foreign domestic workers (FDWs) make up 11.6 million, or 7%, of the total migrant worker population. Previous research has pointed to FDWs experiencing poor physical and mental health due to poor living and working conditions. However, the majority of these studies have utilized qualitative data collection methods and cannot be generalized to the population as a whole. Hong Kong, a modern city of 7.5 million, is home to 399,320 FDWs primarily from the Philippines and Indonesia. Because of this, Hong Kong is an ideal setting for doing a quantitative study to look at FDWs living and working conditions and their health outcomes.

Purpose: To establish associations between living and working conditions and mental and physical health among female foreign domestic workers in Hong Kong.

Methods: Due to setbacks in data collection during the COVID-19 pandemic, data will be collected in two ways. A multi-stage, cluster random sampling method will be used to conduct online surveys of Filipino and Indonesian FDWs. Additionally, convenience sampling, through social media, will be conducted to supplement the random sampling, for a projected total sample size of 2000. Respondents will be asked about their demographics, living and working conditions, lifestyle factors, and health conditions. EQ5D will be used to assess health related quality of life. Stress (single item scale), depression (PHQ9), and anxiety (GAD7) will be used to assess mental health. We will look at associations between employment conditions, lifestyle factors, and demographic factors on health.

Results: In this on-going study, 1721 FDWs (1586 Filipino, 135 Indonesian) have participated. The average hours reported working each day was 12.5 hours. Sleeping in the kitchen, living room, or other open space was reported by 2.4%. Recently feeling stress “to some extent” to “very much” was reported by 26%. Probable anxiety had a prevalence of 6.3%, while moderate to severe depression was reported by 8.6% of respondents. The average VAS score from EQ5D (scale from 1 worst health to 100 best health) was 81.3.

Conclusion: Further research exploring feasible solutions to causes of poor health among female FDWs is needed.

Critical Health Literacy in the Post-COVID-19 Era

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Background: The adjustments to COVID-19 have accelerated digital healthcare. In the digital transformation of future healthcare system, people will be exposed to an increasing number of open-source platforms that they need to judge false or misleading information. Building critical health literacy skills (CHL) can help citizens critically analyse health-related information and to use digital solutions to improve their health. Clearly defining what is meant by CHL is a crucial step.

Objective: This study aimed to identify the main attributes of CHL.

Methods: A scoping review was conducted to identify relevant studies published from 1990 to 2021 in three electronic databases (Medline, Scopus, and Web of Science).

Results: The review identified a total of 58 articles. We grouped the main attributes into three domains: (1)“critical appraisal of information”: includes individuals’ abilities to evaluate the information in terms of its credibility, reliability, validity, and applicability. (2)“understanding social determinants of health (SDH)”: coveys individuals’ understanding of the relationship between how individuals experience social determinants and the impact of the determinants on health; and understanding of the relationship between SDH and health inequities. (3)“actions to address SDH”: focuses on the translation of knowledge into action to address the modifiable determinants to help shape a community’s future.

Discussion: This analysis showed that the components of CHL not only include critical information appraisal skills. The other two domains are also essential. On the one hand, understanding SDH contributes to critical “knowing” to achieving health — health problems are affected by downstream factors (e.g. individual lifestyle) but also a result of upstream factors (e.g. socioeconomic position). This understanding helps people to grasp the reasons behind certain health-related recommendations such as vaccination and shift their actions from individual-level change to community-level change. On the other hand, actions to address SDH imply that individuals should engage with information rather than simply be passive recipients of it.

Conclusion: The definition of CHL enables policymakers, researchers, and educators to design health promotion practices to empower citizens to be well informed, make appropriate health-related decisions, and promote health.

All-cause hospitalization of seasonal influenza vaccination among the elderly: A systematic review and meta-analysis

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Objective: To develop pooled vaccine effectiveness (VE) estimates for seasonal influenza vaccination (SIV) for the elderly using all-cause hospitalization as outcome measure to provide better insights for VE evaluation.

Methods: A systematic review was performed to identify observational studies reporting all-cause hospitalization as outcome measure for the VE of SIV. We searched MEDLINE (Ovid) and EMBASE from inception to June 2020. Meta-analysis with random effects model for all-cause hospitalization was conducted. Heterogeneity and publication bias were assessed.

Results: We identified 5 cohort studies for systematic review and meta-analysis from a total of 1782 studies in the initial search. The pooled VE estimate of SIV among elderly considering all-cause hospitalization as primary outcome was 10% (95% CI 5% to 14%, $p < 0.05$). Significant heterogeneity ($I2 = 91.1\%$) was demonstrated. Large p-value (0.7519) in Egger's test and symmetrical funnel plot were observed.

Conclusion: Pooled VE estimate of SIV considering all-cause hospitalization as outcome measure was derived. Heterogeneity of our study could be due to differences among study characteristics and designs, vaccine strain match, underlying conditions and previous vaccination status. Funnel plot suggests no significant publication biases, while this study may still be prone to other possible biases such as reporting bias. Overall, review of current evidence demonstrated significant VE of SIV among the elderly by reducing all-cause hospitalization, which could be utilised in encouragement of SIV uptake by public health officials in the future.

Accounting for imported cases in estimating the time-varying reproductive number of COVID-19 in Hong Kong

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Background: Estimating the time-varying reproductive number, Rt, is critical for monitoring transmissibility of an infectious disease. When local transmission is effectively suppressed, imported cases could substantially impact transmission dynamics. The impact of imported cases on the estimation is rarely explored.

Methods: We developed a model to estimate separately the Rt for local cases and imported cases, with accounting for imperfect contact tracing of cases. This could account for potential different infectiousness among local and imported cases, since certain public health measures aim only to reduce onwards transmission from imported cases. We applied this framework to data on COVID-19 outbreaks in Hong Kong.

Results: The estimated Rt for local cases rise above 1 in late March, 2020, which was undetected by other commonly used methods. Assuming the same infectiousness of local and imported cases underestimated Rt for local cases due to control measures targeting travelers. We conducted extensive simulation studies and suggested that when the proportion of unlinked local cases was <50%, our framework could provide unbiased estimates.

Conclusion: When imported cases accounted for a considerable proportion of all cases, their impact on estimating Rt is critical. The methodology described here can allow for differential infectiousness of local imported cases.

Comparative sensitivity of different sampling approaches for the diagnosis of SARS-CoV-2 infection by RT-PCR testing: a systematic review and meta-analysis

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Purpose: Sensitivity is an important diagnostic indicator, measuring the ability of a diagnostic test to correctly identify patients who have the disease with a positive test result. A systematic review and meta-analysis assessing the comparative sensitivity of different alternative sampling approaches for diagnosing SARS-CoV-2 infection by RT-PCR testing in community health settings is needed.

Methods: In this systematic review and meta-analysis, we systematically searched 4 different databases and 2 preprint platforms. We included original clinical studies that examined the performance of nasopharyngeal swabs and any additional respiratory specimens for the diagnosis of SARS-CoV-2 infection among individuals presenting in ambulatory care. Studies without data on paired samples, or those that only examined different samples from confirmed SARS-CoV-2 cases were not useful for examining diagnostic performance of a test and were excluded. We examined sensitivity of each sampling approach using random effects models.

Results: A total of 26 studies including 9684 participants were included. Using nasopharyngeal swabs as the gold standard, pooled nasal and throat swabs gave the highest sensitivity of 97% (95% CI 93–100), whereas lower sensitivities were achieved by nasal swabs (86%, 77–93), saliva (85%, 75–93) and gargle (85%, 65-98), and a much lower sensitivity by throat swabs (68%, 35–94). Comparison between health-care-worker collection and self-collection for pooled nasal and throat swabs and nasal swabs showed comparable sensitivity.

Conclusions: Our review suggests that, pooled nasal and throat swabs would be the best alternative sampling approach to nasopharyngeal swabs, for diagnosis of SARS-CoV-2 infection in ambulatory care. Saliva, gargle and nasal swabs gave a comparably good and still reasonable sensitivity and are clinically acceptable alternative sampling approaches. All these alternative sampling approaches appeared as a feasible option to facilitate self-collection of specimens and scaling up of diagnostic testing programme. Throat swabs gave a much lower sensitivity and should not be recommended.

Roles of different periods of COVID-19 outbreak on the association between poor sleep and mental health problems among Hong Kong aged population

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Background: This study intended to examine whether the association between poor sleep and mental health problems among Hong Kong community-aged men varied during different periods of COVID-19.

Methods: From July 2019 to September 2020, we repeatedly recruited a total of 242 community males aged over 60 years involving three periods of COVID-19 outbreak (i.e., before, between the 2nd and 3rd wave, and during the 3rd wave of COVID-19). Sleep characteristics were measured by Pittsburgh Sleep Quality Index questionnaire and mental health problems were assessed by Hospital Anxiety and Depression Scale. Unconditional logistic regression models were performed for the associations between sleep and depression or anxiety during different period of the COVID-19 outbreak. Possible multiplicative and additive interactions between sleep characteristics and the period effects of COVID-19 were also tested.

Results: The age distribution of participants recruited between three periods of the outbreak was similar with an average age of 72.9 years among these periods. Community-aged males recruited during the 2nd and 3rd wave of the outbreak inclined to have better sleep quality but worse mental health status, whereas these health indices during the 3rd wave reverted to a similar level to that of pre-COVID-19. Poor sleep quality was positively associated with depression (AOR=3.27, 95%CI: 1.60-7.03) or anxiety (AOR=2.40, 95%CI: 1.07-5.76) among all subjects recruited across these periods of the outbreak. Regarding the period effects of the outbreak, neither the phase between the 2nd and 3rd wave nor during the 3rd wave of the outbreak was significantly associated with anxiety. However, participants enrolled between the 2nd and 3rd wave had an increased likelihood of depression (AOR=2.65, 95%CI: 1.22-5.83) and also showed an additive interaction with poor sleep (relative excess risk due to interaction=3.66, 95%CI: 0.75, 11.23).

Conclusions: Results from this repeated cross-sectional study revealed that the positive association between poor sleep and depression among Hong Kong aged community people was further strengthened by the COVID-19 pandemic, but it only sustained in a short term. Along with

the provision of psychological consultation during disaster or pandemic, sleep-well programs should also be promoted to alleviate mental health problems among aged community population.

Keywords: Sleep; depression; anxiety; COVID-19; time-series cross-sectional study.

Impact of COVID-19 vaccination with differential vaccine efficacy against infection in Hong Kong

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Background: Since March 2021, the Hong Kong (HK) government has implemented COVID-19 vaccine distribution scheme with two types of vaccine available with different vaccine efficacy (VE) against infections. However, the impact of differential vaccine efficacy against infections is still unclear.

Methods: We developed an age-structured SARS-CoV-2 transmission model based on the Susceptible-Exposed-Infected-Removed system. In the model, the population was stratified into 5 age groups (0-14, 15-44, 45-64, 65-79 and ≥80 years old). An estimated contact matrix was used to represent social mixing patterns during the spread of respiratory diseases in HK. We assumed that children aged 0-14 are less susceptible while the elderly aged over 65 are more susceptible than those aged 15 to 64.

In the analysis, we assumed there are 3 levels of difference in VE against infection for two types of vaccine, namely low, medium and high difference, representing 15%, 30% and 45% differences in VE, assuming a 95% VE for the high VE vaccine. We assumed that vaccination would reduce the force of infection for vaccinated individuals.

To explore the potential outcomes, we ran simulations to compare the number of cases given: (1) different proportions of population received high VE vaccine; (2) different initial effective reproduction numbers (Re) capturing transmission under wild type, delta variant and stringent non-pharmaceutical interventions (NPIs).

Results: Assuming an initial Re = 2.5 where no vaccination or NPI is implemented, we estimated that 74.5% (95% Uncertainty Interval (UI): 65.8%-79.6%) of total population could experience COVID-19 infections. When high VE vaccine represents 80% of total doses, the proportion of infected cases reduce to 12.8% (0.3%-31.1%) with two types of vaccines that have high VE difference compared to 8.1% (0.1%-26.2%) where VE difference is low. When high VE vaccine represents less than one third of total doses, an outbreak could not be controlled even with the implementation of stringent NPIs (Re = 1.2).

Conclusion: Vaccination is expected to reduce the COVID-19 infections dramatically. However, when less than 50% of total population receiving high VE vaccine, even stringent NPIs may not be able to control a local outbreak.

Factors associated with screening for hypertension, diabetes, and lipid disorders: a population-based survey

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Objectives: This study aimed to evaluate the factors associated with willingness to join a healthcare voucher scheme which subsidized screening of cardiovascular risk factors in a Chinese population.

Methods: We conducted a telephone survey by random selection of 1,200 subjects who (1). were aged 45 years or above; (2). could communicate in Cantonese, Putonghua or English; and (3) resided in a Hong Kong household at the time of the study (27 July to 30 August 2020). We collected data on their attitude, perception and perceived feasibility of a medical voucher scheme that subsidized screening for hypertension, diabetes and lipid disorders. Socio- demographic information; family and personal history of chronic diseases; self-perceived health status; and screening histories of chronic diseases were collected. The survey was devised, pilot-tested and validated by a panel of epidemiologists, biostatisticians, physicians, and experts on healthcare systems. The outcome variables included (1). Previous participation in screening for hypertension, diabetes and lipid disorders; and (2). Their willingness to join the voucher scheme. The association between each predictor variable was examined with the outcome variables by univariate analysis. Binary logistic regression models were constructed to examine the independent association between the predictors having $p \leq 0.10$ in the univariate analysis and each outcome variable, separately. We assumed 50% as the proportion in all the outcomes, and approximately 1,200 participants could achieve a precision level of 0.03.

Results: The response rate was 56.8%. The overall rate of having received at least one type, two types and all three types of screening tests was 81.1%, 80.7%, 79.3%, respectively. The overall rate of willingness to join the voucher scheme (among those aged ≥ 45) was 83.7%. From multivariate regression analysis, female gender (adjusted odds ratio (aOR)=0.488, 95% C.I. 0.282, 0.845, p=0.010) and family history of cardiovascular disease (aOR=2.765, 95% C.I. 1.471, 5.196, p=0.002) were independent predictors of willingness to join.

Conclusion: Our findings highlighted the significance of gender and family history on screening of cardiovascular factors. These independent predictors identified inform evidence- based formulation and implementation of screening strategies that aim to enhance the screening rate of the three cardiovascular risk factors.

Acknowledgement: The study was supported by the Public Policy Research Fund of the Policy Innovation and Coordination Office (PICO) of the Hong Kong Government.

Prioritizing Chinese medicine clinical research questions in cancer palliative care from patient and caregiver perspectives

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Background: Chinese medicine (CM) modalities, including acupuncture and Chinese herbal medicine (CHM), are popular palliative interventions among patients with cancer, but further clinical research is required to assess their effectiveness and safety. This study aimed to prioritize top ten important CM clinical research questions from patients with cancer, cancer survivors and caregivers' perspectives via a face-to-face prioritization workshop in Hong Kong.

Methods: A list of 25 CM clinical research questions for cancer palliative care, which were identified from existing systematic reviews (SRs) and overview of SRs, was presented to 17 participants (patients with cancer [n = 5], cancer survivors [n = 6] and caregivers [n = 6]). The participants were then invited to establish consensus on prioritizing top ten research questions.

Results: Among the top ten priorities, five (50%) focused on acupuncture and related therapies, while five (50%) were on CHM. The three most important research priorities were (i) manual acupuncture plus opioids for relieving pain; (ii) CHM for improving quality of life among patients receiving chemotherapy; and (iii) concurrent use of CHM plus loperamide for reducing stomatitis.

Conclusion: The top ten participant-endorsed CM clinical research priorities for cancer palliative care can guide local researchers on future direction. They can also inform local research funders on patient-centred allocation of limited funding. Under limited research funding, the most important co-prioritized research question from professional and patient perspectives may be addressed first.

Exploring psychological impact due to COVID-19 pandemic among nurses in Hong Kong

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Background: In responds to the recent COVID-19 pandemic, understanding the important aspect of resilience is essential to promote healthy workforce, hence to strengthen the health systems for combating future crisis.

Methods: A cross-sectional survey using a structured questionnaire was conducted between May and June 2021. All registered nurses in Hong Kong were invited through the Association of Hong Kong Nursing Staff. The psychological impact during the COVID-19 pandemic include resilience and level of anxiety among nurses were measured using the abbreviated version of the Connor–Davidson Resilience Scale (CD-RISC2) and the General Anxiety Disorder-7 (GAD-7) respectively. Intention to uptake COVID-19 vaccine were also collected to explore their association. The resilience level among different level of anxiety and the preference of receiving COVID-19 vaccine were compared using Analysis of Variance (ANOVA). All p values ≤ 0.05 in the analysis were regarded as statistically significant.

Results: A total of 2,165 registered nurses were recruited with 88.2% were female and 75.3% had tertiary or above education attainment. Over two thirds (68.0%) were employed under public sectors. The overall resilience level was still considerably lower than the Hong Kong population norms with mean (SD) scores of 4.85 (1.48) and 5.03 (1.37), respectively. However, elder respondents (age > 50 years) reported higher resilience levels with mean (SD) scores of 5.27 (1.43). Most of the respondets reported not having any anexity problem (74.7%) or only perceived mild anxiety level (20.8%) while 4.6% of them had moderate to severe anxiety levels. Significantly low resilience with mean (SD) scores of 4.12 (1.45) was reported among those who perceived moderate to severe anxiety levels. Whereas those who had a preference of receiving COVID-19 vaccine had a higher resilience with mean (SD) scores of 4.91 (1.48).

Conclusion: While the COVID-19 epidemic continues and low COVID-19 vaccine uptake rate remains, resilience among individuals could be negatively affected and subsequently more people require services. This study provides some important insights to the aspect of resilience, hence strengthening the healthcare system in Hong Kong.

Estimating excess sepsis mortality and hospitalization burden associated with influenza in Hong Kong, 1998 to 2015

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Background: Influenza infection is associated with high morbidity and mortality, and a significant proportion of this results from associated sepsis. However, severe influenza is frequently underdiagnosed and there is currently limited data on the importance of sepsis as a clinical outcome of influenza virus infection. As a result, there is a need for statistical modelling in the estimation of morbidity and mortality burden of influenza.

Methods: We applied linear regression models to mortality and hospital admission data coded for septicaemia from 1998 to 2015 in Hong Kong and included proxy measures for influenza virus activity in the community for each influenza type/subtype as covariates, and also adjusted for covariates including RSV activity, mean temperature and absolute humidity. A covariate was included to account for change in sentinel surveillance practice in Hong Kong during and after the 2009 influenza A(H1N1)pdm09 pandemic.

Results: Our study estimates an annual influenza-related excess sepsis mortality rate of 0.23 (95% CI: 0.03, 0.44) and an excess sepsis hospitalization rate of 2.01 (95% CI: 1.17, 2.93) per 100,000 persons per year. In comparison, we found that influenza was associated with 6.27 excess deaths and 184 excess hospitalizations per 100,000 persons per year from January 1998 through June 2013 in Hong Kong. The mortality and hospitalization burden were highest in influenza B and influenza A(H3N2) subtype respectively. Influenza-related sepsis disease contributed to a significant hospitalization burden across all age groups, in particular the extremes of age.

Conclusion: Our study applied statistical models to estimate excess hospitalization and mortality rates resulting from influenza-associated sepsis. Estimates were in line with current literature and demonstrated the highest morbidity and mortality in the older adults and young children, and in cases associated with influenza A(H3N2). These are potential areas where public health interventions could be targeted. Our model could allow more accurate estimation of disease activity and facilitate public health interventions and policy planning.

Change of predictors of novel coronavirus vaccine uptake and hesitancy over time among adults in Hong Kong

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Introduction: The key to bringing our community back to normality is the COVID-19 vaccine. However, the vaccine uptake rate remained sluggish since the vaccination programme commenced in late February 2021 in Hong Kong. Understanding the drivers and barriers towards vaccine uptake is urgently needed.

Purpose: This study aims to examine the predictors of COVID-19 vaccine uptake and hesitancy among adults before and after the implementation of the COVID-19 vaccination programme in Hong Kong.

Methods: This study involved cross-sectional telephone surveys every 4 weeks for 7 months. In each survey, there were several sections to collect demographic data and responses on the perceived risk of COVID-19, perceived personal efficacy in self-protection, confidence in the government's ability to control the pandemic, compliance to social distancing measures and confidence in COVID-19 vaccines. Multivariable logistic regression models were used to examine the predictors that may have an impact on COVID-19 vaccine uptake and hesitancy at different time points.

Results: From November 2020 to May 2021, we have conducted 8 cross-sectional surveys, 5402 respondents in total. Around 52-58% of the respondents intended to take the vaccine 3-4 months before the vaccination programme, but the rate decreased to 44.4% 1-2 months later. Since the implementation of the programme, the projected vaccine uptake rate (vaccinated or intent to take vaccines) bounced back to 55.4% in late February, but the rate declined again to around 43-49% 1-3 months later.
The regression analysis showed that the confidence in COVID-19 vaccines was positively associated with vaccination intention consistently. Before the vaccination programme implemented, the association between chronic medical conditions and vaccination intention was insignificant. However, 1-3 months after the implementation, respondents with chronic medical conditions were less willing to get vaccinated. One month before and after the implementation, higher confidence in the government was associated with higher vaccination intention, while this predictor was insignificant 2-4 months before the implementation.

Conclusion: The predictors of COVID-19 vaccine uptake and hesitancy may change over time. This study highlighted the importance to monitor the changes of these drivers and barriers and adjust policy-making correspondingly to boost vaccine uptake.

Incidence of influenza virus infection in older adults in Eastern China in a prospective cohort study, 2016

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Purpose: The objective of this study is to estimate the incidence of influenza virus infections in older adults in Jiangsu Province, China.

Methods: A prospective cohort study was conducted in Suzhou and Yancheng with regular follow-up every 6-12 months. Consecutive paired sera against A/Michigan/45/2015 (H1N1), A/HK/4801/2014(H3N2) and B/Brisbane/60/2008 were tested by hemagglutination inhibition (HAI) assay. Serologic evidence of infection was indicated by a 4-fold or greater increase in HAI titers in consecutive paired sera. We estimated cumulative incidence of infection of each influenza type/subtype overall and by age group.

Results: We estimated that 8%, 4% and 3% of older adults were infected with A(H1N1), A(H3N2) and B, respectively, during 2016. The age-specific cumulative incidence among older adults aged 60-69,70-79 and 80-89 were 9%, 7% and 7% in H1N1(2015), 4%, 5% and 3% in H3N2 (2014) and 4%, 5% and 3% in B (2008).

Conclusion: We found that influenza H1N1 circulated in the winter of 2015/16 with no substantial seasonal influenza activity after that period. Increasing the vaccination coverage among older population would reduce the burden on influenza in older adults in China.

The latent period distribution of severe acute respiratory syndrome coronavirus 2, a retrospectively study

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Introduction: The latent period describes the time interval between infection and becoming infectious that could be compared with incubation period which describes the time duration between infection and showing symptoms. Latent period is shorter than incubation period for some COVID-19 cases because of existing of pre-symptomatic transmission. In this study, we aimed to estimate the latent period distribution of COVID-19 and compare it with the incubation period distribution.

Methods: To estimate latent period, we extracted data on exposure window which including the earliest and latest dates of exposure to infection, and virus shedding window which including date of the last negative PCR test and first positive PCR test which provide a window for the time at which detectable virus shedding began. We also collected onset dates for symptomatic cases to estimate incubation period. Gamma distribution using maximum likelihood was used to estimate latent period accounting for the double interval-censoring and accounting for the fact that most cases were recruited in the decreasing phase of outbreak.

Results: 177 cases were analyzed. The mean estimate of latent period for overall cases was 5.5 days (95% CI: 5.1-5.9 days) with 95% of cases started shedding virus before 10.6 days (95% CI: 9.6-11.6 days) after infection. Among symptomatic cases, the mean latent period was 5.5 days (95% CI: 5.1-6.0 days), 1.4 days shorter than the mean incubation period (6.9 days, 95% CI: 6.3-7.5 days). The mean latent period for asymptomatic cases was 5.2 days (95% CI: 4.3-6.1 days).

Conclusions: The mean estimate of latent period distribution for COVID-19 to be 5.5 days with a 95th percentile of 10.6 days. This could be used to inform the duration of quarantine when laboratory testing is used in combination with symptom monitoring, and would be an important input into studies of the transmission dynamics of COVID-19.

Universal community testing programme for COVID-19 in Hong Kong: a comparative study with the existing clinical and public health surveillance

Background: Testing of an entire community has been used as an approach to control COVID-19. In Hong Kong, a universal community testing programme (UCTP) was implemented at the fadeout phase of a community epidemic in July to September 2020, to determine the prevalence of unrecognised infections and limit any remaining transmission chains. We described the utility of the UCTP in finding unrecognised infections, and analysed data from the UCTP and other sources to characterise transmission dynamics.

Methods: We described the characteristics of people participating in the UCTP, and compared the clinical and epidemiological characteristics of COVID- 19 cases detected by the UCTP versus those detected by clinical diagnosis and public health surveillance. We developed a Bayesian model to estimate the age-specific incidence of infection and the proportion of cases detected by clinical diagnosis and public health surveillance.

Findings: 1.77 million people, 24% of the Hong Kong population, participated in the UCTP from 1 to 14 September 2020. The UCTP identified 32 new infections (1.8 per 100,000 samples tested), consisting of 29% of all local cases reported during the two-week UCTP period. Compared with the existing clinical diagnosis and public health surveillance, the UCTP detected a higher proportion of sporadic cases (62% versus 27%, $p < 0.01$) and identified 6 (out of 18) additional transmission chains during that period. We estimated that 27% (95% credible interval: 22%, 34%) of all infections were detected by the existing clinical diagnosis and public health surveillance in the third wave

Interpretation: We reported empirical evidence of the utility of population-wide COVID-19 testing in detecting unrecognised infections and transmission chains. Around three quarters of infections have not been identified through existing surveillance approaches including contact tracing.

COVID-19 residential clustering and efficiency of building-wide compulsory testing as a transmission control measure in Hong Kong

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Purpose: Our study measured the extent of Severe Acute Respiratory Syndrome coronavirus 2 (SARS-CoV-2) case clustering within residential buildings throughout the Hong Kong outbreak and the efficiency of case detection in building-wide compulsory testing notices (CTNs).

Methods: The residential addresses and cluster information of locally transmitted SARS-CoV-2 cases were geocoded and analysed to quantify the number of cases and unique clusters reoccurring at residential buildings. Addresses of residential buildings targeted in CTNs were geocoded and matched with reported cases using coordinates and relevant dates. CTNs were stratified by justification including, ambush lockdowns, confirmed cases in a building, and positive sewage samples. The rate of linked or untraceable cases per building targeted in CTNs were calculated along with rate ratios (RR) to evaluate the efficiency of untraceable case detection between CTN justification.

Results: As of April 25th, 2021, there were 8457/11,737 (79.9%) locally transmitted cases with valid address identified. These cases were divided into 6959 unique clusters spread across 3843 residences (median case per building= 1, interquartile range = 2, maximum = 26; median cluster per building = 1, interquartile range = 2, maximum = 19). We identified 349/5039 (7.0%) cases associated with building-wide CTNs (N=1211) since their implementation on November 21st, 2020. More than one third of cases identified by CTNs (139/349, 39.8%) were coded as untraceable. There was strong evidence ($p<0.001$) that the rate of untraceable case detection in CTNs justified by confirmed cases in a building was more efficient than CTNs within ambush lockdowns or from positive sewage samples (RR: 4.8 [95% CI: 2.6, 9.0] and 2.2 [1.3, 3.5], respectively).

Conclusions: Residential clustering involving multiple apartments in the same building appears to be relatively uncommon, indicating that building-wide CTNs are a relatively inefficient method to detect unrecognised cases, although some CTNs were able to identify some cases that might not otherwise have been identified so quickly.

Covid Vaccination Promotion, the strategy to promote Covid vaccination in two local hospitals amidst the Covid crisis in Hong Kong

Purpose: ***Covid*** vaccination program was started in February 2021. Of the two vaccines available locally, the ***'Sinovac'*** was available in HA hospital, while the ***'Biontech'*** vaccine has to be taken in the Community Vaccination Center. Vaccination rate of healthcare worker was monitored. Three months have passed and the vaccination rate in the two hospitals was at around 20% and 25% only. The paper depicted the strategy we employed to promote ***Covid*** vaccination within the two local hospitals.

Methods: A team approach was adopted with the Vaccination promotion team comprising of the senior hospital of the hospital, including the Hospital Chief Executive, General Manager of Nursing and Administration. The vaccination data at hands were critically analyzed. Staff groups and departments with low vaccination rate were identified. Current literatures on ***Covid*** vaccination promotion and Vaccination promotion in general were reviewed. The importance of role modelling and peer pressure were identified. Emphasize were put on the departments and groups with low vaccination rate. We took reference from Kotter's 8-step change management in setting our milestone in the roadmap and timeline. A multi-prong promotion program was agreed with horizontal and vertical approach.

Results: Six weeks into the promotion and the overall vaccination rate of the two hospitals were 51% and 53%. A few departments and staff group (i.e. A&E medical staff) have achieved 100% vaccination rate. We are still seeing an increasing trend in certain departments and staff groups, though we have not set a target to achieve; we hope to reach the 80% mark by the end of the year.

Conclusions: We have introduced 'change' management in the ***Covid*** vaccination promotion. The vaccination rate has increased double in the space of six weeks and we would very much hope the momentum can be sustained by the end of year.

Antibiotic use during prior hospitalization and short-to-medium term risk of re-admission with sepsis

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Objective: To explore potential risk factors associated with readmission with sepsis within 1 year following the previous hospital discharge.

Methods: A case-control study was conducted with admission data of inpatients who received antibiotic treatment during admissions in public hospitals in Hong Kong in 2003-2015. Patients readmitted with a discharge diagnosis of sepsis within 12 months following the previous hospitalization were included as cases in our analysis, in comparison with the selected controls who were re-admitted due to other causes than sepsis. The control patients were matched with the cases by propensity score on age group, sex, year of admission and days of hospital stay at a 1:1 ratio using the nearest neighborhood method. Logistic regression was used to identify potential risk factors associated with readmission with sepsis, particularly antibiotic use during the previous admission. Antibiotics were classified into first line, second line and last resort.

Results: In total, 81,843 inpatients were readmitted with sepsis within one year following the previous admission (non-sepsis) during the study period. Over 80% were 65 years and above, and around half were female in both cases and controls. First line antibiotics consisted of more than 70% of the total antibiotic treatment days per hospital bed-day in both cases and controls, while cases were prescribed with more second line and last resort antibiotics in the earlier admission compared with controls. The logistic regression showed that the risk of readmission with sepsis was associated with an exclusive use of last resort antibiotics (OR: 1.68, 95%CI: 1.57-1.80), the use of second line (OR: 1.13, 95%CI: 1.11-1.16) or last resort (OR: 1.32, 95%CI: 1.27-1.37) antibiotics in the earlier admission.

Conclusion: Antibiotic stewardship program should be improved given the potential risk of readmission with sepsis in those exposed to second line and last resort antibiotic treatment during the previous hospitalization.

Methodological quality of systematic reviews on interventions for osteoarthritis: a cross-sectional study

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Background: Osteoarthritis is a common disease and affects approximately 240 million people. It is one of the top 10 disabling diseases among developed countries. Healthcare providers need reliable evidence for supporting the adoption of new interventions, of which the source of evidence often originates from systematic reviews (SRs). However, little assessment on the rigor of SRs related to osteoarthritis interventions has been conducted. This cross-sectional study aimed to evaluate the methodological quality and predictors among SRs on osteoarthritis interventions.

Methods: Four electronic databases (Cochrane Database of Systematic Reviews, MEDLINE, Embase, and PsycINFO) were searched, from 1 January 2008 to 10 October 2019. An SR was considered as eligible if it focused on osteoarthritis interventions, and performed at least one meta-analysis. Methodological quality was assessed using the validated AMSTAR 2 instrument. Multivariate regression analyses were conducted to assess predictors of methodological quality.

Results: A total of 167 SRs were included and appraised. The most SRs were non-Cochrane reviews (88.6%), and 54.5% investigated non-pharmacological interventions. Only seven (4.2%) had high methodological quality. Respectively, eight (4.8%), 25 (15.0%), and 127 (76.0%) SRs had moderate, low, and critically low quality. Main methodological weaknesses were as follows: only 16.8% registered protocol a priori, 4.2% searched literature comprehensively, 25.7% included lists of excluded studies with justifications, and 30.5% assessed risk of bias appropriately by considering allocation concealment, blinding of patients and assessors, random sequence generation and selective reported outcomes. Cochrane reviews [adjusted odds ratio (AOR) 251.5, 95% confidence interval (CI) 35.5–1782.6], being updates of previous SRs (AOR 3.9, 95% CI 1.1–13.7), and SRs published after 2017 (AOR 7.7, 95% CI 2.8–21.5) were positively related to higher methodological quality.

Conclusion: Despite signs of improvement in recent years, most of the SRs on osteoarthritis interventions have critically low methodological quality, especially among non-Cochrane reviews. Future SRs should be improved by conducting comprehensive literature search, justifying excluded studies, publishing a protocol, and assessing the risk of bias of included studies appropriately.

Methodological quality of systematic reviews on treatments for osteoporosis: A cross-sectional study

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Background: Osteoporosis is a common skeletal disease resulting in increased bone fragility and susceptibility to fracture. Systematic reviews (SRs) provide the best evidence on the effectiveness of treatment strategies for osteoporosis. Carefully conducted SRs provide high-quality evidence for supporting decision-making, but the trustworthiness of conclusions can be hampered by limitation in rigor.

Objective: To appraise the methodological quality of a representative sample of SRs on osteoporosis treatments in a cross-sectional study.

Methods: Cochrane Database of Systematic Reviews, EMBASE, MEDLINE, and PsycINFO were searched for eligible SRs on osteoporotic treatments. AMSTAR (A MeaSurement Tool to Assess systematic Reviews) 2 was used to evaluate methodological quality of SRs. Associations between bibliographical characteristics and methodological quality ratings were explored using multivariate regression analyses.

Results: A total of 101 SRs were included and appraised for methodological quality. Overall, 1 (1.0%) was rated “high quality”, 3 (3.0%) were rated “moderate quality”, 11 (10.9%) were rated “low quality”, and 86 (85.1%) were rated “critically low quality”. Ninety-nine (98.0%) did not explain study design selection, 85 (84.2%) did not provide a list of excluded studies (84.2%), and 85 (84.2%) did not report funding sources of included studies. SRs published in 2018 or after were associated with higher overall quality [adjusted odds ratio (AOR): 5.48; 95% confidence interval (CI): 1.12–26.89], while SRs focused on pharmacological interventions were associated with lower overall quality [AOR: 0.24; 95% CI: 0.06–0.96].

Conclusion: The methodological quality of the included SRs is far from satisfactory. Future reviewers must strengthen rigor by improving literature search comprehensiveness, registering and publishing a priori protocols, and optimising study selection and data extraction. Better transparency in reporting conflicts of interest among reviewers, as well as sources of funding among included primary studies, are also needed.

Familial Correlation between Rheumatoid Arthritis and Autism

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Introduction: Autism Spectrum Disorders (ASD) and Rheumatoid Arthritis (RA) share important risky genes, i.e. HLA-DRB1 genes, and environmental risk factors, i.e. preterm. However, only a few studies examined the relationship between ASD and RA and got mixed results.

Objective: To examine the familial correlations between RA and ASD and whether the correlations are genetic origins.

Method: We followed a birth cohort born from 1995 to 2015 with Swedish-born parents. The diagnoses of related disorders were obtained from Swedish Patient Register. Children's parental relatives (mothers, fathers, maternal/paternal aunts&uncles) and peer relatives (full siblings, maternal/paternal half siblings&cousins) were identified by Swedish registries. To examine the familial correlations, we fitted separate cox models for different parental relatives. We compared peer relatives' Relative Recurrence Risk (RRR) of ASD in two nested cox models: one with maternal RA and one without. All cox models took the length of follow-up time of ASD as outcome, corresponding relatives' RA as exposure, adjusted by parental age, birth year, parental psychiatric history. To examine the correlation origin, we fitted liability threshold models (ACE model) using full siblings and cousins' data to compare the change of variance of genetic component of ASD before and after adjusting maternal RA/parental RA. The adjustments applied to ACE model included birth year and sex.

Results: There were a total of 1,471,265 children, of which ASD cases were 28,609(1.94%) and 12,526(0.85%) children had RA mothers. The adjusted hazard ratio was 1.30(95%CI: 1.17-1.44) for maternal RA and was 1.30(95%CI: 1.04–1.62) for maternal aunts. No significant results were found in other parental relatives. RRRs of peer relatives' ASD and variance estimate of genetic component did not changed after adjusting RA.

Conclusion: No familial correlations were found between RA and ASD, but maternal RA showed as an independent risk factor of children's ASD. Maternal aunts' RA could be false significant due to strong correlation to maternal RA. By examining the origins, no familial correlations were confirmed, and the risk of maternal RA is not likely to be genetic origins.

Prioritization of palivizumab prophylaxis for respiratory syncytial virus associated diseases in high-risk population in Hong Kong

Background: Respiratory syncytial virus (RSV) causes acute respiratory tract infections in humans every year, resulting in an enormous public health burden worldwide. However there was clearly no consensus on guidelines of palivizumab prophylaxis around the world. Our study aims to measure the cost-effectiveness of prophylaxis with palivizumab in prevention of RSV-associated diseases in high-risk population in Hong Kong.

Methods: Based on the RSV seasons characterized in our previous work (Figure 1), our study examined the cost-effectiveness of treating infants with palivizumab for three strategies. RSV-associated diseases records were collected from infant patients with diagnosis of RSV infection admitted to the two public hospitals, Queen Mary Hospital and Pamela Youde Nethersole Eastern Hospital. The cost-effectiveness of prophylaxis was assessed by the incremental cost per hospital admission prevented (HAP). Meanwhile, our study made an extrapolation with outcomes in Hong Kong and conducted one-way deterministic sensitivity analyses to test the robustness of results

Results: Annual incidence of RSV infections with and without high-risk conditions respectively were 153 and 2498 infant inpatients per 100,000 infants in Hong Kong. In the high-risk groups, infants with PTL & BPD, or HS-CHD were at higher risk of having a severe RSV infection. Different groups perhaps needed to be treated with palivizumab at different times of a year with different schedules to maximize the cost-effectiveness of the treatment (Table 1). With limited healthcare resources our study provided the priorities for specific high groups, of which infants with CLD/BPD should be given top priority of receiving immunoprophylaxis, followed by NMI, PTL (without BPD), HS-CHD, CHD & DS, PTL & BPD, and DS. Additionally, annual total health expenditure for RSV prophylaxis of high-risk and non-risk groups in Hong Kong respectively should amount to USD 0.26 million and 3.31 million based on their related optimal prophylactic strategy (yellow mark in Table 1). Moreover, one-way deterministic sensitivity analyses confirmed the results of the base-case scenario.

Conclusions: Our study optimized seasonal administration of prophylaxis with palivizumab, as well as proposed the priorities for specific groups with limited healthcare resources, giving new insights into maximizing the cost-effectiveness of prophylaxis for high-risk infants in Hong Kong.

Acknowledgements

The College would like to acknowledge the following Fellows for taking part as examiners in various fellowship examinations in the past year:

Prof. CHAN Ying Yang Emily

Dr. Beatrice CHENG

Dr. CHING Cheuk Tuen Regina

Dr. CHOY Khai Meng

Prof. CHUNG Pui Hong

Dr. CHUNG Wai Hung Thomas

Dr. FUNG Yu Kei Anne

Prof. Hong FUNG

Dr. HO Lei Ming Raymond

Dr. HO Shiu Wei William

Prof. HUNG Chi Tim

Dr. IP Kai Ming Dennis

Dr. KOH Yi Mien

Dr. LAM Chau Kuen Yonnie

Dr. LAM Mei Yee

Prof. LAM Tai Hing

Dr. LEE Ha Yun Libby

Dr. LEE Koon Hung

Dr. LEUNG Chi Chiu

Dr. LEUNG Ching Kan Jackie

Prof. LEUNG Ting Hung

Dr. LEUNG Yue Yan June

Dr. Teresa LI

Dr. LO Su Vui

Prof. LUI Cho Ze Joseph

Dr. MA Siu Keung Edmond

Dr. MAK Sin Ping

Dr. NG Ping Sum Sammy

Dr. PANG Fei Chau

Dr. TAM Yat Hung

Dr. Helen TINSLEY

Dr. TO Liza May Kei

Dr. TSANG Ho Fai Thomas

Dr. TUNG Sau Ying

Prof. WONG Yeung Shan Samuel

Prof YEOH Eng Kiong