Scientific research on COVID-19 conducted in Hong Kong in 2020

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This article was published on 16 Aug 2021 at www.hkmj.org.

Hong Kong Med J 2021;27:244–6
https://doi.org/10.12809/hkmj215121

Much research has been conducted into the coronavirus disease 2019 (COVID-19) pandemic internationally and regionally.[1-4] Before the pandemic became widespread, researchers in Hong Kong have alerted health authorities to initiate emergency measures.[5,6] The accumulated scientific evidence on COVID-19, including clinical characteristics, transmission, risk factors, diagnostic testing and screening, immune responses, treatment and pharmaceutical prophylaxis, and vaccines has greatly helped inform the infection prevention, early recognition, rapid identification, and disease control of COVID-19. Research attention paid to the routine clinical management of chronic conditions are of equal importance in the wider context of the pandemic, given the dynamic links between COVID-19 and underlying health conditions.[7]

In this issue of the *Hong Kong Medical Journal*, Yee et al[8] reviewed institutional data from all urology centres in the government-run healthcare sector in Hong Kong during the COVID-19 pandemic, to assess the changes in urology practice and resident training. Compared with a control period, the authors report drastic reductions of 28.5% to 49.6% in the numbers of operating sessions, clinic attendances, cystoscopy sessions, prostate biopsies, and shockwave lithotripsy sessions across all the centres reviewed. The number of surgeries performed by residents was also reduced dramatically during the pandemic. Key aspects of urology practice have undergone substantial changes, which resulted as a response to challenges including shortages in frontline healthcare resources such as personal protective equipment, or rigid management of patient flow in hospitals. Similar challenges were identified in primary care during the early phase of the COVID-19 outbreak, as shown in a cross-sectional study conducted among family doctors affiliated with the Hong Kong College of Family Physicians.[9] In other specialist services such as obstetrics and gynaecology practices, restrictive measures intended to limit the spread of COVID-19 resulted in an increased psychological burden on pregnant women who experienced cancellation of prenatal exercises, antenatal talks, hospital tours, and postnatal classes.[10] Local researchers also advocated the importance of identifying and prioritising 'time-sensitive' patients for assisted reproductive technology.[11] From a clinical perspective, the gap in clinical preparedness for COVID-19 necessitates further frontline research to develop risk triage protocols with optimal diagnostic performance and a widely accepted 'gold-standard' cut-off level to inform guideline recommendations and support clinical management decisions.[12]

Research conducted to explore the epidemiological and clinical manifestations of COVID-19 has substantially contributed to reducing community spread of severe acute respiratory syndrome coronavirus 2 in Hong Kong. A local investigation using data retrieved from the Clinical Management System of the Hospital Authority demonstrated the successful role of the first public COVID-19 temporary test centre in identifying infected individuals in a large-scale high-turnover setting.[13] The volume and complexity of information documented in electronic health records, including clinical symptoms, imaging investigations, contact history, nucleic acid testing and vaccination records, has been growing exponentially to underpin digital solutions that support efforts to limit the spread of COVID-19. Big data analytics, artificial intelligence, and machine learning techniques have gained increasing prominence in generating reliable evidence that can help measure personalised clinical risk of severe illness and may potentially contribute to regional and global forecasts.[14] Such progress will inevitably be accelerated by increasing uptake of electronic health records and mobile apps in mass data collection to support scientific research and public health measures. Nevertheless, due consideration in protecting personally identifiable information and ensuring data privacy in the context of COVID-19 is becoming a controversial but crucial concern over individual-level data exchange and sharing that deserves concomitant research.

Coping with COVID-19 requires simultaneous inputs from and participation of different medical disciplines. A local study conducted by radiologists assessed the use of computed tomography (CT) scanning of the thorax as a non-invasive imaging

modality in exploring viral pneumonia patterns that were commonly encountered in affected patients.[15] This provides an opportunity to gain temporal insights into the extent of lung involvement on CT images and determine the accuracy of CT severity scoring in clinical triage and the prediction of post-COVID outcomes. It is highly sensitive, accessible, portable, and easy to operate,[16] playing an important role in identification of COVID-19.[17] A group of specialists in ophthalmology, anaesthesiology, otorhinolaryngology, pathology and surgery, together with other relevant stakeholders, have formulated a risk stratification protocol with structured workflow for emergency surgeries.[18] It bears a wider applicability to frontline healthcare staff with regard to timely assessment and decision making in the arrangement of emergency operations across different disciplines. There have also been suggestions to use chemoprophylaxis in adjunct with health behaviours and social distancing measures,[19] which could achieve a synergistic effect.[20] Meanwhile, social distancing remains an important strategy along with concurrent measures of infection control, even for individuals who have completed the vaccination course.[21] A deeper understanding of such dynamic interaction warrants extensive research that bridges biostatistics and mathematical modelling. In managing COVID-19, there will continue to be a reliance on multidisciplinary clinical work to optimise patient care, following guidelines and recommendations that are both internationally recognised and locally adaptable, given the availability of resources and the changing severity of the pandemic. High-quality evidence generated from appropriately designed, well-planned, and ethically approved studies are continuously needed.

Behavioural research conducted to understand people's behaviours and their linkage to knowledge, beliefs, and concerns is a key step to shape the messages on prevention measures delivered to target population and thus enhance risk communications and community engagement against the spread of COVID-19.[22] An example was illustrated in an observational study published recently in the *Hong Kong Medical Journal*, which assessed the public views on face mask performance, reuse of surgical mask, and health information source among pedestrians in well-populated locations in Hong Kong.[23] The authors brought behavioural insights into the issues of a high mask reuse rate during the initial spread of COVID-19 and the popularity of social media over government websites for information seeking. Research drawing on valuable perspectives from social science disciplines that twin with the biomedical understanding of the COVID-19 carries a great potential to inform the planning of effective behavioural interventions, as the containment of complex epidemics is as much behavioural as medical. A further step towards empirical evidence on behaviour changes and cultural factors can therefore support the pandemic response through promoting risk and science communication with the public to achieve optimal compliance to infection prevention and control measures.

The above examples, and others published in the *Hong Kong Medical Journal* (https://www.hkmj.org/COVID-19), are a small part of the huge volume of research activities led by local researchers in Hong Kong in response to the global pandemic of COVID-19. Despite the rapid progress made, many unknown but unique characteristics of severe acute respiratory syndrome coronavirus 2 are yet to be uncovered. Uncertainties remain on issues such as the natural history of COVID-19, the impact of viral changes over time, the long-term effectiveness and safety of vaccines, and the cost-effectiveness of different public health and social epidemic control measures. Ongoing medical and translational research is required that thinks globally and acts locally, to investigate the epidemiological, clinical, therapeutic, and service aspects of COVID-19 management, incorporating the latest advances in virology, immunology, molecular microbiology, and other disciplines of laboratory-based basic science.

Author contributions

All authors contributed to the concept or design; acquisition of data; analysis or interpretation of data; drafting of the article; and critical revision for important intellectual content. All authors had full access to the data, contributed to the study, approved the final version for publication, and take responsibility for its accuracy and integrity.

Conflicts of interest

The authors have declared no conflict of interest.

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