Telemedicine acceptance by older adults in Hong Kong during a hypothetical severe outbreak and after the COVID-19 pandemic: a cross-sectional cohort survey

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ABSTRACT

Introduction: Telemedicine services worldwide have experienced unprecedented growth since the early days of the coronavirus disease 2019 (COVID-19) pandemic. Multiple studies have shown that telemedicine is an effective alternative to conventional in-person patient care. This study explored the public perception of telemedicine in Hong Kong, specifically among older adults who are most vulnerable to COVID-19.

Methods: Medical students from The Chinese University of Hong Kong conducted in-person surveys of older adults aged ≥60 years. Each survey collected socio-demographic information, medical history, and concerns regarding telemedicine use. Univariate and multivariate logistic regression analyses were conducted to identify statistically significant associations. The primary outcomes were acceptance of telemedicine use during a hypothetical severe outbreak and after the COVID-19 pandemic.

Results: There were 109 survey respondents. Multivariate logistic regression analyses revealed that the expectation of government subsidies for telemedicine services was the strongest common driver and the only positive independent predictor of telemedicine use during a hypothetical severe outbreak (P=0.016) and after the COVID-19 pandemic (P=0.003). No negative independent predictors of telemedicine use during a hypothetical severe outbreak were identified. Negative independent predictors of telemedicine use after the COVID-19 pandemic included older age and residence in the New Territories (both P=0.001).

Conclusion: Government support, such as telemedicine-specific subsidies, will be important for efforts to promote telemedicine use in Hong Kong during future severe outbreaks and after the COVID-19 pandemic. Robust dissemination of information regarding the advantages and disadvantages of telemedicine for the public, especially older adults, is needed.

Hong Kong Med J 2023;29:412–20
https://doi.org/10.12809/hkmj219747

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This article was published on 5 Oct 2023 at www.hkmj.org.

New knowledge added by this study

- Older age and residence in the New Territories were negative predictors of telemedicine use during a hypothetical severe outbreak and after the coronavirus disease 2019 (COVID-19) pandemic.
- The expectation of government support (eg, subsidies) is a positive predictor of telemedicine use during a hypothetical severe outbreak and after the COVID-19 pandemic.

Implications for clinical practice or policy

- Telemedicine carries minimal risk of disease transmission and may serve as a powerful addition to conventional in-person consultation, but it will not completely replace conventional consultation methods.
- Government support, such as telemedicine-specific subsidies and public education, will help encourage telemedicine use in Hong Kong.

在假設的疫情嚴重爆發期間和新冠肺炎大流行後香港長者對遠程醫療的接受程度：橫斷面隊列調查

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簡介：自新冠肺炎疫情大流行初期以來，全球遠程醫療服務經歷了前所未有的增長。多項研究表明，遠程醫療是傳統面對面患者護理的有效替代方案。這項研究探討了香港公眾對遠程醫療的看法，特別是最容易感染新冠肺炎的長者。

方法：香港中文大學醫學院的醫科生對60歲以上長者進行了現場調查，收集他們的社會人口統計資料、病史及對使用遠程醫療的擔憂。本研究使用了單變量和多變量邏輯迴歸分析以確定統計學上的顯著關聯。主要結果是在假設的疫情嚴重爆發期間和新冠肺炎大流行後對遠程醫療使用的接受程度。

結果：這項研究共有109名受訪者。多變量邏輯迴歸分析顯示，預期政府補貼遠程醫療服務是假設的疫情嚴重爆發期間（P=0.016）和新冠肺炎大流行後（P=0.003）遠程醫療使用的最強共同驅動因素和唯一積極的獨立預測因素。在假設的疫情嚴重爆發期間沒有發現遠程醫療使用的負面獨立預測因素。新冠肺炎大流行後使用遠程醫療的負面獨立預測因素包括年齡較大和居住在新界（兩者均為P=0.001）。

結論：政府的支持（例如遠程醫療特定補貼）對於在未來疫情嚴重爆發期間和新冠肺炎大流行後促進香港遠程醫療的使用非常重要。有關方面需要向公眾（尤其是長者）廣泛宣傳遠程醫療的利弊。

Introduction

In 2020, the coronavirus disease 2019 (COVID-19) pandemic caused many healthcare services worldwide to experience a decline in patient numbers because of cancellations related to a fear of disease transmission.[1] This decline led to increasing interest in the expansion of telemedicine services (ie, the practice of medicine over a distance through telecommunication systems[2]) as a potential solution to address gaps in healthcare delivery and minimise the risk of COVID-19 transmission.[3]

Despite the availability of numerous virtual technological solutions, Hong Kong has not experienced significant progress towards the widespread implementation and promotion of telemedicine.[4] Therefore, exploration of the factors contributing to the relative underutilisation of telemedicine by older adults in Hong Kong will help to identify current limitations of the healthcare system, while facilitating future implementation of telemedicine.

The primary objectives of this study were to examine the main concerns that older adults have towards telemedicine and then evaluate telemedicine use in two hypothetical scenarios: during a severe outbreak while under lockdown, and after the COVID-19 pandemic. In this study, 'severe outbreak' was defined as a sudden increase in disease frequency within a limited geographic area, which requires public health interventions (eg, a government-imposed lockdown involving temporary restrictions on travel and social interactions, along with quarantine measures)[5]; 'after the COVID-19 pandemic' was defined as the expected new norm (ie, endemic COVID-19 requiring regular vaccines, with societal adaptation to seasonal deaths and complications in the absence of lockdowns, masks, or social distancing).[6]

This study specifically explored perception of telemedicine among older adults because they have the highest risk of severe COVID-19[7,8] and may experience the greatest benefit from telemedicine use.

Methods

Study design and participants

This study consisted of an online survey completed by a cohort of older adults in Hong Kong. The survey was conducted from 8 October to 15 November 2020, between the third and fourth waves of COVID-19 in the city.[9,10] Medical student volunteers from The Chinese University of Hong Kong were recruited to facilitate data collection from older adults in their families. Considering the overall need for social distancing, we assumed that random in-person visits to older adults carried a high risk of disease transmission.[11] Therefore, we chose to survey close relatives of medical students living in the same household; this approach was expected to reduce the risk of disease transmission among medical students and participants.[11]

In total, 59 medical student volunteers were recruited in September 2020. To ensure standardisation of the survey protocol, a mandatory virtual training course was conducted via Zoom on 28 September 2020, which included a detailed written survey guide to help the volunteers to facilitate the survey.

This study adhered to the STROBE (Strengthening the Reporting of Observational Studies in Epidemiology) guidelines.

Procedures

The survey targeted older adults (aged ≥60 years) in Hong Kong. The closest caretakers were allowed to complete the survey on behalf of older adults who had health-related difficulty expressing themselves.[12] This completion-by-proxy approach was used because such caretakers regularly accompany older adults to medical appointments and are likely to have a good overall understanding of those older adults' healthcare needs. The survey was completed

and submitted online; consent was obtained from each participant before the start of the survey, and all surveys were facilitated by trained medical student volunteers.

The survey consisted of multiple-choice questions that addressed five factors with important effects on the perception of telemedicine among older adults: (1) socio-demographic characteristics, including age, gender, education level, number of cohabitants in the same household, employment status, and residential area; (2) medical history, including types of chronic illnesses, frequency and difficulty of visiting regular doctors in public and private sectors, numbers and types of prescribed medications, and private health insurance enrolment status; (3) domestic support for telemedicine use, including digital device availability and internet access; (4) acceptance of telemedicine use in two scenarios (ie, during a hypothetical severe outbreak and after the COVID-19 pandemic); and (5) telemedicine-associated values, concerns, and expectations (eg, concerns about effectiveness and satisfaction). With respect to the acceptance of telemedicine use in two scenarios, respondents were informed that telemedicine is mainly used during follow-up for chronic medical conditions or when visiting a doctor who is familiar with the patient and their medical history; it is rarely used to visit an unfamiliar doctor for a new or acute medical condition.

Statistical analysis

Data analysis was performed using SPSS (Windows version 26.0; IBM Corp, Armonk [NY], United States). The cohort survey responses were first thematically classified into four main categories, namely demographics, home characteristics, medical history, and telemedicine-related factors. The two main primary outcome variables in our study were dichotomous variables concerning acceptance of telemedicine use: during a hypothetical severe outbreak and after the COVID-19 pandemic.

Univariate logistic regression analysis was conducted to identify predictors of telemedicine use during a hypothetical severe outbreak and after the COVID-19 pandemic, respectively. Multivariate logistic regression analysis was performed using variables that were statistically significant in univariate analysis. To avoid variable overfitting, for acceptance of telemedicine use during a hypothetical severe outbreak, only variables with P values <0.05 in univariate analysis were included in multivariate analysis; for acceptance of telemedicine use after the pandemic, only variables with P values <0.01 in univariate analysis were included in multivariate analysis. Continuous data were reported as mean ± standard deviation.

Results

Cohort characteristics

Of the 109 respondents surveyed by 59 medical student volunteers, 93.6% were older adults, whereas 6.4% were caretakers who completed the survey on behalf of an older adult they cared for. The detailed characteristics of the cohort are shown in Table 1. The mean respondent age was 72.7 ± 10 years; most respondents were women (57.8%) and had at least completed secondary education (68.8%). In terms of household characteristics, 44.0% of the respondents lived in the New Territories and the mean size of each household was 2.9 ± 1.5 members. Although most respondents had access to both the internet (93.6%) and digital devices (91.7%), none had previously used telemedicine; thus, they were unable to indicate which type of telemedicine they would prefer.

The survey also collected detailed information about the respondents' medical histories. In terms of disease epidemiology, the most common chronic disease types were cardiovascular (52.3%), metabolic/endocrine (29.4%), and musculoskeletal (20.2%); the mean number of medications taken was 2 ± 2. Most respondents regularly consulted one to three doctors in both the public (54.1%) and private sectors (57.8%), but fewer than half of the respondents had private medical insurance coverage (41.3%). In terms of telemedicine, most respondents valued avoiding hospital or clinic environments because of the potential for disease transmission (67.0%); they also expected that government subsidies[13] would increase their likelihood of using telemedicine (64.2%).

Furthermore, nearly half of the respondents worried that telemedicine use would lead to reduced effectiveness and lower satisfaction (45.9%); however, fewer than half of the respondents valued maintaining the doctor-patient relationship (17.4%) or reducing waiting time (30.3%).

Stratification of survey data according to acceptance of telemedicine use revealed that 89 respondents (81.7%) would accept telemedicine during a hypothetical severe outbreak; after the COVID-19 pandemic, 43 respondents (39.4%) would accept telemedicine. The characteristics of respondents who would and would not accept telemedicine during a hypothetical severe outbreak and after the pandemic are presented in the online supplementary Appendix.

Factors affecting telemedicine use during a hypothetical severe outbreak

Multivariate logistic regression analysis (Table 2) showed that the expectation of government subsidies for telemedicine services was the only positive independent predictor of telemedicine use during

TABLE 1. Cohort characteristics (n=109)*

	No. (%)
Demographic characteristics	
Older adult respondent	102 (93.6%)
Age, y	72.7 ± 10
Female sex	63 (57.8%)
Education	
Primary or below	34 (31.2%)
Secondary	48 (44.0%)
Tertiary or above	27 (24.8%)
Home characteristics	
Region	
New Territories	48 (44.0%)
Kowloon	38 (34.9%)
Hong Kong Island	23 (21.1%)
No. of household members	2.9 ± 1.5
Internet access	102 (93.6%)
Digital devices	100 (91.7%)
No previous use of telemedicine	109 (100%)
Medical history	
Disease type	
Cardiovascular	57 (52.3%)
Metabolic/endocrine	32 (29.4%)
Musculoskeletal	22 (20.2%)
No. of medications taken regularly	2 ± 2
No. of doctors consulted regularly	
Public sector	
0	44 (40.4%)
1-3	59 (54.1%)
4-6	6 (5.5%)
Private sector	
0	45 (41.3%)
1-3	63 (57.8%)
4-6	1 (0.9%)
Private medical insurance coverage	45 (41.3%)
Telemedicine-related factors	
Value avoiding hospital/clinic environment because of potential for disease transmission	73 (67.0%)
Expect that government subsidies will increase likelihood of telemedicine use	70 (64.2%)
Worry about reduced effectiveness and lower satisfaction	50 (45.9%)
Value shorter waiting time	33 (30.3%)
Value maintaining doctor-patient relationship	19 (17.4%)

* Data are shown as No. (%) or mean ± standard deviation

a hypothetical severe outbreak (adjusted odds ratio [aOR]=5.043, 95% confidence interval [CI]=1.353-18.795; P=0.016). No negative independent predictors of telemedicine use during a hypothetical severe outbreak were identified.

Factors affecting telemedicine use after the coronavirus disease 2019 pandemic

Multivariate logistic regression analysis (Table 3) showed that the expectation of government subsidies for telemedicine services was the strongest common driver and the only positive independent predictor of telemedicine use after the pandemic (aOR=6.068, 95% CI=1.882-19.563; P=0.003). However, there were two negative independent predictors of telemedicine use after the pandemic: older age (aOR=0.897, 95% CI=0.842-0.956; P=0.001) and residence in the New Territories rather than on Hong Kong Island (aOR=0.109, 95% CI=0.029-0.405; P=0.001).

Discussion

Interpretation of results

In this study, multivariate logistic regression analysis revealed no negative independent predictors of reduced telemedicine use during a hypothetical severe outbreak. This result may be explained by the fear of COVID-19 within the Hong Kong population, which has prompted citizens to avoid public transport and practise social distancing.[14] Because many Hong Kong citizens experienced the severe acute respiratory syndrome epidemic in March 2003, they remain fearful of unknown infectious diseases.[15] Considering that telemedicine carries minimal risk of disease transmission compared with conventional in-person consultation,[16] it is clearly valuable in epidemic and pandemic scenarios; however, studies thus far have shown that telemedicine is less effective than hands-on procedures (eg, physical examination or postoperative care).[17] Nonetheless, rapid technological advancements may soon overcome these limitations. Therefore, it is reasonable to infer that the characteristics and benefits of telemedicine outweigh its limitations during severe outbreaks, including epidemic and pandemic scenarios.

In both 'severe outbreak' and 'after COVID-19 pandemic' scenarios, the expectation of government subsidies for telemedicine services was the strongest common driver of telemedicine use; it was also the only statistically significant positive independent predictor of telemedicine use after the COVID-19 pandemic. For example, the Elderly Health Care Voucher Scheme launched in Hong Kong in 2009 was intended to provide financial incentives for older adults to seek healthcare services in the private sector, thereby alleviating strain within the public healthcare system. Thus far, this scheme has contributed to positive uptake of telemedicine in the private sector.[13] Therefore, to encourage use of telemedicine services during the pandemic, we propose extending telemedicine-specific subsidies to older adults.

TABLE 2. Factors affecting telemedicine acceptance during a hypothetical severe outbreak

	Univariate		Multivariate	
	OR (95% CI)	P value*	aOR (95% CI)	P value
Demographic characteristics				
Age, y	0.943 (0.897-0.992)	0.023	0.985 (0.92-1.056)	0.673
Female sex	0.895 (0.333-2.404)	0.825		
Education		0.471		
Primary or below	Reference			
Secondary	1.333 (0.456-3.902)	0.600		
Tertiary or above	2.462 (0.584-10.371)	0.220		
Home characteristics				
Region		0.268		
New Territories	1.474 (0.372-5.836)	0.581		
Kowloon	0.589 (1.161-2.518)	0.425		
Hong Kong Island	Reference			
No. of household members	1.419 (0.989-2.035)	0.058		
Internet access	1.867 (0.335-10.393)	0.476		
Digital devices	1.302 (0.249-6.792)	0.755		
Medical history				
Disease type				
Cardiovascular	0.682 (0.254-1.828)	0.447		
Metabolic/endocrine	1.306 (0.431-3.958)	0.636		
Musculoskeletal	0.511 (0.17-1.535)	0.232		
No. of medications taken regularly	0.79 (0.626-0.997)	0.047	0.958 (0.668-1.374)	0.814
No. of doctors consulted regularly				
Public sector		0.006		0.475
0	Reference		Reference	
1-3	0.436 (0.129-1.476)	0.182	1.303 (0.263-6.463)	0.746
4-6	0.02 (0.002-0.216)	0.001	0.252 (0.011-5.912)	0.392
Private sector		0.044		0.132
0	Reference		Reference	
1-3	3.859 (1.337-11.137)	0.013	4.257 (1.039-17.441)	0.044
4-6	/	/	/	1
Private medical insurance coverage	3.417 (1.058-11.033)	0.040	1.637 (0.338-7.925)	0.54
Telemedicine-related factors				
Worry about reduced effectiveness and lower satisfaction	0.291 (0.102-0.828)	0.021	0.424 (0.106-1.691)	0.224
Value shorter waiting time	2.881 (0.782-10.612)	0.112		
Value maintaining doctor-patient relationship	0.155 (0.052-0.465)	0.001	0.225 (0.046-1.113)	0.067
Value avoiding hospital/clinic environment because of potential for disease transmission	4.062 (1.480-11.150)	0.007		
Expect that government subsidies will increase likelihood of telemedicine use	8.125 (2.664-24.781)	<0.001	5.043 (1.353-18.795)	0.016

Abbreviations: aOR = adjusted odds ratio; CI = confidence interval; OR = odds ratio

* Variables with a statistical significance of P<0.05 in univariate logistic regression analysis were selected for multivariate logistic regression analysis

TABLE 3. Factors affecting telemedicine acceptance after the coronavirus disease 2019 (COVID-19) pandemic

	Univariate		Multivariate	
	OR (95% CI)	P value*	aOR (95% CI)	P value
Demographic characteristics				
Age, y	0.907 (0.864-0.951)	<0.001	0.897 (0.842-0.956)	0.001
Female sex	0.396 (0.18-0.872)	0.021		
Education		0.019		
Primary or below	Reference			
Secondary	1.2 (0.464-3.106)	0.707		
Tertiary or above	4.08 (1.393-11.947)	0.010		
Home characteristics				
Region		0.027		0.003
New Territories	0.239 (0.083-0.684)	0.008	0.109 (0.029-0.405)	0.001
Kowloon	0.468 (0.163-1.345)	0.158	0.461 (0.132-1.615)	0.226
Hong Kong Island	Reference		Reference	
No. of household members	1.146 (0.891-1.475)	0.289		
Internet access	4.2 (0.488-36.180)	0.191		
Digital devices	1.333 (0.315-5.642)	0.696		
Medical history				
Disease type				
Cardiovascular	0.361 (0.163-0.799)	0.012		
Metabolic/endocrine	1.544 (0.670-3.560)	0.308		
Musculoskeletal	0.849 (0.322-2.236)	0.740		
No. of medications taken regularly	1.239 (0.992-1.549)	0.059		
No. of doctors consulted regularly				
Public sector		0.082		
0	Reference			
1-3	0.401 (0.178-0.902)	0.027		
4-6	0.457 (0.076-2.755)	0.393		
Private sector		0.151		
0	Reference			
1-3	2.238 (0.993-5.042)	0.052		
4-6	/	/		
Private medical insurance coverage	4.5 (1.978-10.239)	<0.001	2.284 (0.784-6.652)	0.130
Telemedicine-related factors				
Worry about reduced effectiveness and lower satisfaction	0.402 (0.181-0.896)	0.026		
Value shorter waiting time	1.429 (0.624-3.272)	0.399		
Value maintaining doctor-patient relationship	0.234 (0.064-0.861)	0.029		
Value avoiding hospital/clinic environment because of potential for disease transmission	2.145 (0.905-5.083)	0.083		
Expect that government subsidies will increase likelihood of telemedicine use	3.875 (1.564-9.603)	0.003	6.068 (1.882-19.563)	0.003

Abbreviations: aOR = adjusted odds ratio; CI = confidence interval; OR = odds ratio

* Variables with a statistical significance of P<0.01 in univariate logistic regression analysis were selected for multivariate logistic regression analysis

Furthermore, the role of government support in promoting telemedicine use should be emphasised and expanded. For example, Hong Kong's older adults could receive subsidies to purchase essential digital devices for telemedicine consultations, such as webcams and remote monitoring devices. Indeed, a study in Australia showed that government support for healthcare, such as the reduction of insurance reimbursement restrictions, has been a key factor in the country's increased use of telemedicine.[18] Moreover, public education regarding telemedicine and digital health overall should be conducted to address patient misconceptions and clarify expectations regarding telemedicine. It is important to emphasise that the use of telemedicine does not imply that patients should discontinue follow-up. Further education concerning the format (eg, video calls and use of digital health applications), effectiveness (ie, limited physical examination), and other aspects of telemedicine is strongly recommended because these were the most important concerns among the respondents in the current study.

There were two statistically significant negative independent predictors of telemedicine use after the COVID-19 pandemic: older age and residence in the New Territories. For older adults, a lack of technological competency is an important challenge when adapting to a new mode of consultation. Older adults often struggle with unfamiliar technology, which may ultimately prevent many of them from using telemedicine. To help older adults adopt new technologies, telemedicine systems should be designed with the goal of maximum user-friendliness.[19] For example, easy-to-navigate interfaces and simple instructions with larger display fonts may help increase older adults' willingness to use telemedicine for chronic illness follow-up after the COVID-19 pandemic.

With respect to older adults who live in the New Territories, a relatively more rural part of Hong Kong, the digital infrastructure necessary to provide telemedicine services may be less robust than the infrastructure on Hong Kong Island and in Kowloon. Indeed, the New Territories has the largest number of high-poverty areas in Hong Kong, which may be associated with low socio-economic status and limited education leading to lower healthcare utilisation.[20] Poverty also has an effect on hospital access, such that the New Territories generally displays the least hospital access among all regions of Hong Kong; however, considering the long travel distances to hospitals and clinics, telemedicine may be very beneficial for residents in this region.[20] Overall, telemedicine accessibility in Hong Kong remains a major concern that requires further investigation.

Strengths

To our knowledge, this is the first study in Hong Kong to comprehensively examine concerns about telemedicine implementation among older adults, both during a hypothetical severe outbreak and after the COVID-19 pandemic. The use of telemedicine as a novel approach to patient consultations may serve as an important component of an effective geriatric healthcare system during the pandemic and could even be implemented as a powerful addition to in-person consultation during clinical practice after the pandemic.[21]

Additionally, the mandatory training course for medical student volunteers and detailed explanation of each question ensured adequate quality control, as well as a full understanding of telemedicine, during the completion of each survey. The training course also ensured uniformity during survey delivery, thereby minimising the potential for confirmation or observer bias that could arise from unstandardised survey delivery styles among different volunteers. A survey guide was explicitly introduced in the training course; it included a detailed rationale of the study as well as key points to consider with each survey question.

Limitations

Because the survey only included the responses of family members of medical students, selection and inter-observer biases were possible. However, these biases were counterbalanced by the comprehensive training course to achieve uniformity during survey delivery. Retrospective analysis of the study results did not suggest that the respondents favoured telemedicine; thus, we concluded that the potential for selection bias was negligible.

This study also had a relatively small sample size because of pandemic-associated social distancing restrictions. For example, the cohort did not involve citizens residing on the outlying islands of Hong Kong. These areas, with their remote locations and limited hospital access,[20] may have a greater need for telemedicine. Therefore, caution is needed when generalising our findings to populations outside of Hong Kong. Furthermore, this study was performed before the formal introduction of a COVID-19 vaccination programme, which has been shown to greatly influence the attitude of the general public towards health-seeking behaviours.[22] Therefore, this study may not be fully representative of the current pandemic situation in Hong Kong.

Future studies

This study primarily focused on older adults. Future studies should investigate the acceptance of telemedicine among younger adults (aged <60 years),

adolescents, and children. Future studies could also compare the perspectives of caretakers and older adults themselves on a larger scale to determine whether concerns differ among stakeholders.

Conclusion

This study examined concerns among older adults regarding the use of telemedicine, both during a hypothetical severe outbreak while under lockdown, and after the COVID-19 pandemic. The findings indicated that government support was a key driver of telemedicine use in Hong Kong under both scenarios. After the pandemic, telemedicine-specific subsidies and public education will be essential for efforts to overcome telemedicine hesitancy that arises from technological inconveniences related to age and geographic location.

In the future, government support via telemedicine-specific subsidies will be a key driver of telemedicine use in Hong Kong, both during a severe outbreak and after the COVID-19 pandemic. The continued use of telemedicine after the pandemic requires telemedicine systems that are designed to ensure maximal age-friendliness. However, telemedicine should be used in combination with conventional in-person consultation rather than as a replacement for such consultation.

Author contributions

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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

All authors have disclosed no conflicts of interest.

Acknowledgement

The authors thank Mr Brian Yiu from the Division of Neurology, Department of Medicine and Therapeutics, The Chinese University of Hong Kong for aid with statistical analysis. The authors also thank all medical student volunteers from The Chinese University of Hong Kong for assisting with in-person surveys.

Declaration

This work was posted on medRxiv as a registered online preprint (https://www.medrxiv.org/content/10.1101/2021.07.15.21260346v1).

Funding/support

This research received no specific grant from any funding agency in the public, commercial, or not-for-profit sectors.

Ethics approval

Ethics approval for the study protocol was obtained from the Joint Chinese University of Hong Kong–New Territories East Cluster Clinical Research Ethics Committee (Ref No.: 2020.536). This research was performed in accordance with the Declaration of Helsinki and consent was obtained from each participant before the start of the survey.

References

1. Wong SY, Zhang D, Sit RW, et al. Impact of COVID-19 on loneliness, mental health, and health service utilisation: a prospective cohort study of older adults with multimorbidity in primary care. Br J Gen Pract 2020;70:e817-24.
2. World Medical Association. WMA statement on the ethics of telemedicine. 2018. Available from: https://www.wma.net/policies-post/wma-statement-on-the-ethics-of-telemedicine/. Accessed 6 Apr 2021.
3. Lau C. Telemedicine in the time of COVID-19 and beyond. MIMS Respirology. 2020. Available from: https://specialty.mims.com/topic/telemedicine-in-the-time-of-covid-19-and-beyond. Accessed 16 Jun 2021.
4. Legislative Council, Hong Kong SAR Government. Development of telehealth services. ISE14/20-21. 2020. Available from: https://www.legco.gov.hk/research-publications/english/essentials-2021ise14-development-of-telehealth-services.htm. Accessed 6 Apr 2021.
5. Reintjes R, Zanuzdana A. Outbreak investigations. In: Krämer A, Kretzschmar M, Krickeberg K, editors. Modern Infectious Disease Epidemiology. New York: Springer; 2010: 159-76.
6. Phillips N. The coronavirus is here to stay—here's what that means. Nature 2021;590:382-4.
7. Mok VC, Pendlebury S, Wong A, et al. Tackling challenges in care of Alzheimer's disease and other dementias amid the COVID-19 pandemic, now and in the future. Alzheimers Dement 2020;16:1571-81.
8. Centers for Disease Control and Prevention, United States Government. COVID-19 risks and information for older adults. 2023. Available from: https://www.cdc.gov/aging/covid19/index.html#:~:text=Older%20adults%20are%20more%20likely,very%20sick%20from%20COVID%2D19. Accessed 25 Sep 2023.
9. Wong MC, Wong EL, Huang J, et al. Acceptance of the COVID-19 vaccine based on the health belief model: a population-based survey in Hong Kong. Vaccine 2021;39:1148-56.
10. Chan WM, Ip JD, Chu AW, et al. Phylogenomic analysis of COVID-19 summer and winter outbreaks in Hong Kong: an observational study. Lancet Reg Health West Pac 2021;10:100130.
11. Chauhan V, Galwankar S, Arquilla B, et al. Novel coronavirus (COVID-19): leveraging telemedicine to optimize care while minimizing exposures and viral transmission. J Emerg Trauma Shock 2020;13:20-4.
12. Reinhard SC, Given B, Petlick NH, Bemis A. Supporting family caregivers in providing care. In: Hughes RG, editor. Patient Safety and Quality: An Evidence-Based Handbook

for Nurses. Rockville (MD): Agency for Healthcare Research and Quality (US); 2008: 341-404.
13. Yam CH, Wong EL, Fung VL, Griffiths SM, Yeoh EK. What is the long term impact of voucher scheme on primary care? Findings from a repeated cross sectional study using propensity score matching. BMC Health Serv Res 2019;19:875.
14. Sit SM, Lam TH, Lai AY, Wong BY, Wang MP, Ho SY. Fear of COVID-19 and its associations with perceived personal and family benefits and harms in Hong Kong. Transl Behav Med 2021;11:793-801.
15. Choi EP, Hui BP, Wan EY. Depression and anxiety in Hong Kong during COVID-19. Int J Environ Res Public Health 2020;17:3740.
16. Kadir MA. Role of telemedicine in healthcare during COVID-19 pandemic in developing countries. Telehealth Med 2020;5:1-5.
17. Williams AM, Bhatti UF, Alam HB, Nikolian VC. The role of telemedicine in postoperative care. Mhealth 2018;4:11.
18. Thomas EE, Haydon HM, Mehrotra A, et al. Building on the momentum: sustaining telehealth beyond COVID-19. J Telemed Telecare 2022;28:301-8.
19. Narasimha S, Madathil KC, Agnisarman S, et al. Designing telemedicine systems for geriatric patients: a review of the usability studies. Telemed J E Health 2017;23:459-72.
20. Guo Y, Chang SS, Sha F, Yip PS. Poverty concentration in an affluent city: geographic variation and correlates of neighborhood poverty rates in Hong Kong. PLoS One 2018;13:e0190566.
21. Grossman Z, Chodick G, Reingold SM, Chapnick G, Ashkenazi S. The future of telemedicine visits after COVID-19: perceptions of primary care pediatricians. Isr J Health Policy Res 2020;9:53.
22. Wang K, Wong EL, Ho KF, et al. Change of willingness to accept COVID-19 vaccine and reasons of vaccine hesitancy of working people at different waves of local epidemic in Hong Kong, China: repeated cross-sectional surveys. Vaccines (Basel) 2021;9:62.

Answers to CME Programme
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I. Awareness, perceptions, and acceptance of human papillomavirus vaccination among parents in Hong Kong

A	1. True	2. False	3. True	4. False	5. True
B	1. False	2. True	3. False	4. True	5. True

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II. Risk factors for postpartum haemorrhage in twin pregnancies and haemorrhage severity

A	1. True	2. False	3. False	4. True	5. True
B	1. True	2. True	3. False	4. False	5. True