

Pregnant women's opinions on universal screening for COVID-19 during hospital admission: a cross-sectional survey

Chun-Yee CHOW, MBChB

Wing-Yi LOK, MBChB, MSc in Medical Genetics, MRCOG, FHKAM (O&G), FHKCOG

Choi-Wah KONG, MBChB, MSc in Medical Genetics, MRCOG, FHKAM (O&G), FHKCOG

William WK TO, MBBS, MPH, MPhil, MD, FRCOG, FHKAM (O&G)

Department of Obstetrics and Gynaecology, United Christian Hospital, Hong Kong

Introduction: The present study aimed to evaluate pregnant women's opinions on universal screening for COVID-19 during hospital admission.

Methods: Between 1 September 2020 and 24 November 2020 in the antenatal ward and labour ward of United Christian Hospital, a self-administrated questionnaire (in Chinese and English) on universal screening was distributed to all obstetric patients upon admission (or after delivery).

Results: Of 600 questionnaires distributed, 520 (86.7%) were returned. Of these, 11 were excluded owing to missing answers and 509 were included in analysis. All respondents had negative results of COVID-19. 98.4% of the women agreed with universal screening for all obstetric patients on admission. 69.0%, 73.9%, and 72.1% of women considered that a negative COVID-19 result would have a positive effect on their own care, their baby's care, and their family, respectively, with 82.1% feeling more ready to breastfeed and 84.9% feeling more at ease to look after their babies after delivery. 97.2% thought that all staff in the obstetric ward should have COVID-19 screening. A logistic regression model showed that women with tertiary education or above (odds ratio [OR]=2.361, $p<0.001$) and with emergency admission (rather than elective admission) [OR=1.686, $p=0.018$] were more likely to believe that a negative screening result would have positive effects on her care, whereas women with tertiary education or above (OR=3.615, $p<0.001$) were more likely to believe that a negative result would have a positive impact on their baby's care.

Conclusion: Universal screening for COVID-19 on admission is well supported by obstetric patients.

Introduction

As of the end of November 2020, the COVID-19 pandemic has affected >6.2 million people worldwide¹. On 23 January 2020, Hong Kong confirmed the first cases of COVID-19 infection, which were identified in individuals who travelled from Wuhan to Hong Kong by high-speed rail and by air². As of 6 December 2020, Hong Kong had 6898 confirmed cases³. The Hong Kong government has tightened measures in social distancing, extended testing services in community centres, outpatient clinics, and private sectors, and adopted mandatory screening for 'high risk' groups³.

Pregnant women in Hong Kong lack a comprehensive understanding of COVID-19, particularly on its effect on pregnancy⁴. Many expressed high levels of concerns on its contraction during pregnancy and showed high degrees of acceptance of universal screening at certain time points of their pregnancy, although the optimal timing suggested varied⁴.

Obstetricians and Gynecologists recommends that SARS-CoV-2 testing should be offered to all pregnant women admitted to hospitals in England regardless of symptoms and that their intended birth partner should also be screened⁵. The prevalence of COVID-19 in the United Kingdom far exceeded that of Hong Kong. It remains controversial whether Hong Kong should adopt a similar policy and whether our obstetric patients support such mandatory screening. Since 17 August 2020 in United Christian Hospital, screening for COVID-19 has extended to all asymptomatic in-patient admissions (both elective and emergency). For elective admissions, deep throat saliva is collected for testing 1 day before the scheduled admission. For emergency admissions, deep throat saliva is collected after 2 hours of fasting. For those already in active labour on admission, nasopharyngeal swabs are taken by healthcare workers. Results are usually available within 6 hours. For urgent cases, results are available within

The latest guideline by the Royal College of

Correspondence to: Dr Chun-Yee CHOW

Email: joeychow@hotmail.com

2 hours, using the GeneXpert, a cartridge-based nucleic acid amplification test. This study aimed to explore pregnant women's view on universal screening of COVID-19 during hospital admission.

Methods

This survey study was approved by the Kowloon Central / Kowloon East Cluster Research Ethics Committee (reference: KCC/KEC-2020-0300). Participants were informed the details of the study; anonymity was ensured. Women who were aged <18 years, cognitively impaired, or not able to understand Chinese/English were excluded. Between 1 September 2020 and 24 November 2020 in the antenatal ward and labour ward of United Christian Hospital, a self-administrated questionnaire (in Chinese and English) on universal screening was distributed to

all obstetric patients upon admission (or after delivery). The questionnaire comprised seven questions on patient demographics and 15 questions on universal screening for COVID-19 during hospital admission.

The sample size was estimated to be 390 assuming that 50% of them would accept universal screening and a random error of up to 5% with 95% confidence level. Assuming the response rate to be 80%, distribution of 500 questionnaires was sufficient. Comparisons were made using the Chi-squared test or Fisher's exact test. A multivariable logistic regression analysis model was constructed to identify clinical covariates associated with pregnant women's acceptance of mandatory universal screening of COVID-19. A p value of <0.05 was considered statistically significant.

Table 1. Characteristic of respondents

	No (%) of respondents	No. (%) of respondents agreeing that universal screening has positive effects on their care		p Value	No. (%) of respondents agreeing that universal screening has positive effects on their baby's care		p Value
Maternal age, y				0.705			0.678
<35	368 (72.3)		252 (71.8)			270 (71.8)	
≥35	141 (27.7)		99 (28.2)			106 (28.2)	
Parity				0.142			0.214
0	234 (46.0)		169 (48.1)			179 (47.6)	
≥1	275 (54.0)		182 (51.9)			197 (52.4)	
Ethnicity				0.959			0.460
Chinese	474 (93.1)		327 (93.2)			352 (93.6)	
Non-Chinese	35 (6.9)		24 (6.8)			24 (6.4)	
Education level				<0.001			<0.001
Non-tertiary	294 (57.8)		181 (51.6)			189 (50.3)	
Tertiary or above	215 (42.2)		170 (48.4)			187 (49.7)	
Family monthly income				0.220			0.027
<\$20 000	192 (37.7)						
\$20 001 to \$40 000	210 (41.3)	<\$40 000	272 (77.5)		<\$40 000	288 (76.6)	
\$40 001 to \$60 000	72 (14.1)	≥\$40 000	79 (22.5)		≥\$40 000	88 (23.4)	
>\$60 000	35 (6.9)						
Gestation, weeks				0.471			0.373
24-27	64 (12.6)						
28-31	42 (8.3)						
32-36	63 (12.4)	<37	113 (32.2)		<37	129 (34.3)	
≥37	340 (66.8)	≥37	238 (67.8)		≥37	247 (65.7)	
Admission type				0.015			0.500
Emergency	386 (75.8)		277 (78.9)			288 (76.6)	
Elective	123 (24.2)		74 (21.1)			88 (23.4)	

Results

Of 600 questionnaires distributed, 520 (86.7%) were returned. Of these, 11 were excluded owing to missing answers and 509 were included in analysis. All respondents had negative results of COVID-19. 27.7% were of advanced maternal age (≥ 35 years) and 46.0% were nulliparous. 42.2% had education level of tertiary or above. 21% had family income of $\geq \$40\,000$ per month. 66.8% were at term gestations (≥ 37 weeks) and 75.8% were emergency admissions (Table 1).

Of 509 women, 501 (98.4%) submitted deep throat saliva specimens and eight (1.6%) submitted nasopharyngeal swab specimens. More women felt that nasopharyngeal swab was uncomfortable (4.4% vs 37.5%, $p=0.005$) but considered that both sampling methods were convenient and acceptable (Table 2).

98.4% of the women agreed with universal screening for all obstetric patients on admission. 85.9% felt relieved if all patients in the ward had been screened for COVID-19. 85.1% considered that the test should not be allowed to opt out. 69.0%, 73.9%, and 72.1% of women considered that a negative COVID-19 result would have a positive effect on their own care, their baby's care, and their family, respectively, with 82.1% feeling more ready to breastfeed and 84.9% feeling more at ease to look after their babies after delivery. 97.2% thought that all staff in the obstetric ward should have COVID-19 screening (Table 3).

More women who considered that a negative COVID-19 test would have positive effects on their own care had tertiary education or above (79.1% vs 61.6%, $p<0.001$) and emergency admission (71.8% vs 60.2%, $p=0.015$) [Table 1]. More women who considered that a negative COVID-19 test would have positive effects on their baby's care had tertiary education or above (87.0% vs 64.3%, $p<0.001$) and family monthly income of $\geq \$40\,000$ (82.2% vs 71.6%, $p=0.027$) [Table 1]. In a binary logistic regression analysis, education level and the type of admission remained significant factors (Table 4).

Discussion

To control the outbreak, public compliance in precautionary behaviours is equally important to rapid and accurate diagnostic testing for COVID-19⁶. The preferred initial diagnostic test for COVID-19 is to detect SARS-CoV-2 RNA using the reverse-transcriptase polymerase chain reaction assay, from upper respiratory tract specimens⁷, which include nasopharyngeal or oropharyngeal specimens, nasal swab specimens from both anterior nares, nasal mid-turbinate swab, nasopharyngeal wash / aspirate specimen, and saliva specimen. These specimens are usually collected by trained healthcare professionals, except for saliva specimens, which can be collected by the person at home or being supervised at the testing site⁷.

In early September 2020, the Hong Kong government conducted a voluntary community screening programme and obtained nearly 1.8 million specimens. The programme identified 32 new confirmed cases, among which 13 were asymptomatic and 20 were local cases with unknown source of infection⁸. Since August 2020, the Hospital Authority has extended screening for COVID-19 to all asymptomatic in-patients and patients attending day services. The use of deep throat saliva specimens waives the need for healthcare workers to collect the specimen and thus reduces the use of personal protective equipment. Most respondents considered this method more acceptable and convenient than nasal and pharyngeal swabs. Saliva samples have a greater sensitivity for detecting early infection or screening asymptomatic patients, and results are more consistent throughout the course of infection⁹. Moreover, collection of nasopharyngeal swabs may cause discomfort to patients and increase exposure risks for healthcare workers⁹.

Although there is no evidence that pregnant women are more susceptible of contracting COVID-19 than the general population, as in the SARS epidemic in 2003¹⁰, there is increased anxiety among pregnant women about their own health, their partner's health, and their child's health, as well as pregnancy outcomes¹¹. There is no concrete

Table 2. Opinions on sampling methods for COVID-19 screening

Question	Patients submitting deep throat saliva (n=501)	Patients submitting nasopharyngeal swab (n=8)	p Value
The screening method is convenient	484 (96.6)	8 (100.0)	1.000
The screening method is uncomfortable	22 (4.4)	3 (37.5)	0.005
The screening method is acceptable	496 (99.0)	7 (87.5)	0.091
Want to choose alternative screening method	85 (17.0)	3 (37.5)	0.145

Table 3. Opinions on universal screening during hospital admission

Question	No. (%) of respondents
Agree with universal screening	
Yes	501 (98.4)
No	8 (1.6)
Felt relieved if all the patients in the ward have been screened for COVID-19	
Yes	437 (85.9)
No	38 (7.5)
No difference	34 (6.7)
Agree that patients should be allowed to opt out the COVID-19 screening	
Yes	76 (14.9)
No	433 (85.1)
Think that a negative COVID-19 result has a positive effect on her care	
Yes	351 (69.0)
No	83 (16.3)
No difference	75 (14.7)
Think that a negative COVID-19 result will have a positive effect on her baby's care	
Yes	376 (73.9)
No	76 (14.9)
No difference	57 (11.2)
Think that a negative COVID-19 result has a positive effect on her family	
Yes	367 (72.1)
No	77 (15.1)
No difference	65 (12.8)
Think that a negative COVID-19 result will make her more ready to breastfeed after delivery	
Yes	418 (82.1)
No	33 (6.5)
No difference	58 (11.4)
Think that a negative COVID-19 result will make her more at ease to look after the baby after delivery	
Yes	432 (84.9)
No	26 (5.1)
No difference	51 (10.0)
Think that all the hospital staff in obstetric ward should have covid-19 screening	
Yes	495 (97.2)
No	14 (2.8)
When should the COVID-19 screening for obstetric patients on admission be discontinued	
When there are no more new cases worldwide	195 (38.3)
When there are no more new cases in Hong Kong	135 (26.5)
When the number of new cases in Hong Kong are fewer than a certain number per day such as 50	29 (5.7)
When vaccines for COVID-19 are available	150 (29.5)

evidence of vertical transmission of COVID-19 through breastfeeding¹². Breastfeeding and skin-to-skin contact should continue during the COVID-19 pandemic after weighing potential benefits of breastfeeding and potential risks of pathogen transmission during breastfeeding¹²⁻¹⁴. Among Hong Kong pregnant women, up to 11.6% opted not to breastfeed because they believed that breastmilk could be a vehicle for COVID-19 transmission even if they were asymptomatic⁴. In our cohort, over 80% of women felt more reassured in breastfeeding and taking care of the baby when the screening test result was negative. Therefore, universal screening may help to relieve psychological stress of women and may be a useful tool in promoting breastfeeding during the pandemic.

In our study, education level was a significant factor affecting women's views on universal screening. A higher proportion of women with tertiary education believed that a negative screening result would have positive effects on their own and their baby's care. In contrast, our earlier study showed that pregnant women who opted out of universal screening during the antenatal course tended to have higher family monthly income (\geq \$40 000) or higher intention to deliver in private hospitals⁴. Therefore, the acceptance of universal screening was significantly higher in the present cohort. With repeated waves of COVID-19, the acceptance of universal screening is expected to increase.

Nearly all respondents agreed that hospital staff should be screened, which so far was not yet a policy adopted in the Hospital Authority hospitals. In a systemic review and meta-analysis of the prevalence of SARS-CoV-2 infection among healthcare workers globally, 11% healthcare workers were tested positive, with 7% being positive for the presence of antibodies and as high as 40% were asymptomatic at time of diagnosis, with nurses (48%) followed by physicians (25%) being the most frequently affected¹⁴. Because a significant portion of healthcare workers who test positive are asymptomatic, policymakers and hospital administrators should formulate plans to screen healthcare workers regularly, in order to minimise transmission risks and to meet the expectations of patients.

In our survey, 38% and 26% of respondents chose to stop screening when no new case is confirmed worldwide and in Hong Kong, respectively. Nearly 30% believed screening can be stopped when vaccines for COVID-19 are available, and 5.7% believed screening can be discontinued when the number of confirmed cases in Hong Kong drops to a certain number. Nonetheless, there is still a need to continue universal screening for all patients. The policy

Table 4. Factors affecting opinions on universal screening

Factors	B	SE	Wald	p Value	Odds ratio (95% confidence interval)
Believed that a negative COVID-19 result has positive effects on her care					
Tertiary education	0.859	0.207	17.181	<0.001	2.361 (1.573-3.544)
Emergency admission	0.522	0.220	5.671	0.018	1.686 (1.095-2.597)
Believed that a negative COVID-19 result has positive effects on her baby's care					
Tertiary education	1.285	0.250	26.517	<0.001	3.615 (2.217-5.897)
Family monthly income \geq \$40000	0.095	0.300	0.099	0.752	1.099 (0.610-1.981)

should be regularly reviewed with respect to the incidence of COVID-19 infections and the cost-effectiveness of screening.

There are limitations to this study. The questionnaires were collected between the third and fourth wave of COVID-19 outbreak in Hong Kong. Results drawn from this survey reflect only the women's views at a certain point of time and may not be generalised to other populations or other time periods.

Conclusions

Universal screening for COVID-19 on admission to hospital is supported by obstetric patients, with deep throat saliva being the preferred method. Patients with higher education levels are more likely to believe that a negative screening result will have positive effects on their care and their babies' care, and are more relieved and reassured to breastfeed and to take care of their babies. Efforts should be made to promote COVID-19 screening for all women during antenatal care before admission and delivery.

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Declaration

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Ethics approval

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Author contributions

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.

Concept or design of the study: Chow CY, Kong CW

Acquisition of data: Chow CY, Lok WY, Kong CW

Analysis or interpretation of data: All authors

Drafting of the manuscript: Chow CY, Kong CW, To WWK

Critical revision for important intellectual content: All authors

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Appendix

We would appreciate it if you could spend 10 minutes completing the following questionnaire.

Please fill in the questionnaire and tick in the box where appropriate.

Choose only one option unless otherwise specified.

Please return the completed questionnaire to us before you are discharged from hospital.

Section 1: Background

- 1) What is your age? _____
- 2) How many babies have you delivered before?
 - 0 1 2 3 or above
- 3) What is your ethnicity?
 - Chinese/ Hong Kong/ Taiwanese
 - Filipino
 - Pakistani
 - Indian
 - Caucasian
 - Others: please specify _____
- 4) What is your education level?
 - Primary school or below Secondary school Tertiary or above
- 5) What is your family income per month?
 - <\$20 000
 - \$20 000-\$40 000
 - \$40 000-\$60 000
 - ≥\$60 000
- 6) What is your current gestation?
 - 24-27 weeks
 - 28-31 weeks
 - 32-36 weeks
 - ≥37 weeks
- 7) What is your reason for the current admission?
 - In labour/ show/ leaking/ uterine contractions
 - Per vaginal bleeding
 - Decrease fetal movement
 - Induction of labour
 - Planned caesarean section
 - Clinically admitted for further work up such as diabetes for sugar profile
 - Other reason: please specify _____

Appendix (cont'd)**Section 2: Opinions on universal screening for COVID-19 on hospital admission**

- 1) What is the route of COVID-19 screening that you have performed?
 deep throat saliva nasopharyngeal swab
- 2) Do you think that the route of screening that you have undergone is convenient?
 Yes No
- 3) Have you felt uncomfortable with this route of screening?
 Yes No
- 4) Do you think that the route of screening that you have undergone is acceptable?
 Yes No
- 5) Will you prefer to choose another route of sampling if you have the choice?
 Yes No
- 6) Do you agree that the hospital should provide this COVID-19 screening for all obstetric patients upon admission?
 Agree
 Disagree
 If you disagree, the reason is:
 No need to do this screening at all
 No need to screen all the patients unless they have symptoms or travel or contact history
 Only need to screen those patients that are in labour or going to be delivered
 Other reasons, please specify: _____
- 7) Do you feel more relieved if all the patients in the ward had been screened for COVID-19?
 Yes No No difference
- 8) Do you think that patients should be allowed to opt out the screening if they don't want to have the test?
 Yes No
- 9) Do you think that a negative COVID-19 result will have a positive effect to your care?
 Yes No No difference
- 10) Do you think that a negative COVID-19 result will have a positive effect to your baby's care?
 Yes No No difference
- 11) Do you think that a negative COVID-19 result will have a positive effect to your family?
 Yes No No difference
- 12) Do you think that a negative COVID-19 test result will make you more ready to breastfeed after your delivery?
 Yes No No difference
- 13) Do you think that a negative COVID-19 test result will make you more at ease to look after your baby after your delivery?
 Yes No No difference
- 14) Do you think that all the staff in the obstetric ward should also be screened for COVID-19 infection regularly to make sure they are not infected?
 Yes No
- 15) Do you think that screening for COVID-19 for obstetric patients on admission should continue under which of the following situation?
 When there are no more new cases worldwide
 When there are no more new cases in Hong Kong
 When new case numbers in Hong Kong are fewer than a certain number per day, eg 50
 When vaccines for COVID-10 are available

~~~~~ End ~~~~~

This is the end of the questionnaire. Thank you very much for completing this questionnaire!  
 Please return the completed questionnaire us before you are discharged from hospital.