Supplemental Materials

Supplemental Table 1. Details for the studies included in this meta-analysis

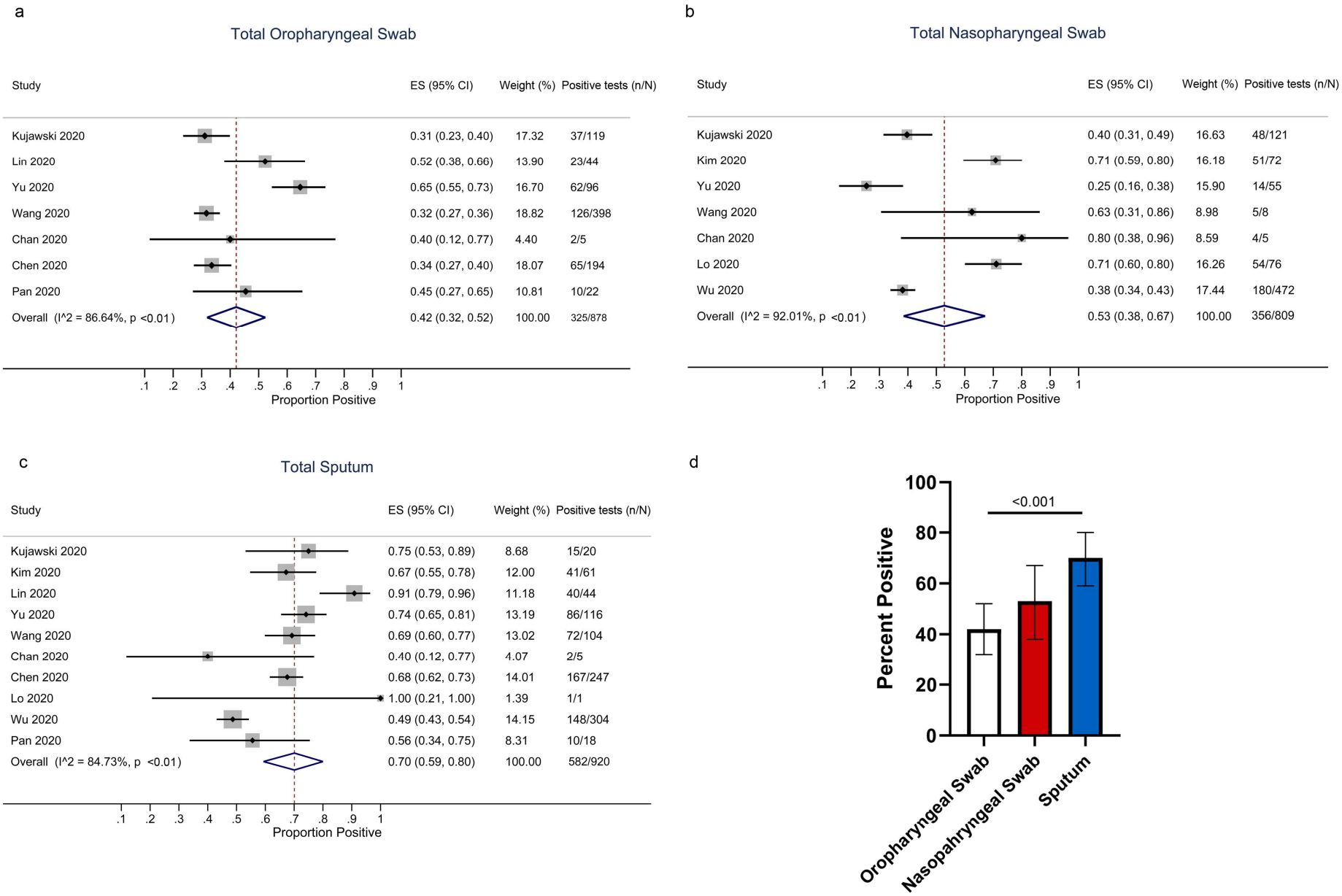
	Diagnostic Assay	In/Out patient	Wk1 OP*	Wk2 OP	Wk3 OP	Total	Wk1 NP	Wk2 NP	Wk3 NP	Total	Wk1 SP	Wk2 SP	Wk3 SP	Total
Kujawski et al (2020)[1]	RT-PCR	In & Out	13/18	15/38	9/63	37/120	13/19	21/38	11/64	48/121	5/5	7/9	3/6	15/20
Kim et al (2020)[2]	RT-PCR (E)	In	..	..	..	..	30/31	19/30	2/11	51/72	25/26	15/26	1/9	41/61
Lin et al (2020)[3]	RT-PCR (ORF1ab, N)	In	..	..	..	23/44	..	..	..	..	..	..	..	40/44
Yu et al (2020)[4]	RT-PCR (ORF1ab, N)	In	..	..	..	62/96	..	..	..	14/55	..	..	..	86/116
Wang et al (2020)[5]	RT-PCR (ORF1ab)	In	..	..	..	126/398	..	..	..	5/8	..	..	..	72/104
Yang et al (2020)[6]	RT-PCR	In & Out	58/95	26/63	15/47	99/205	158/219	130/226	23/45	311/490	45/54	47/61	14/25	106/140
Chan et al (2020)[7]	RT-PCR (S)	..	..	..	..	2/5	..	..	..	4/5	..	..	..	2/5
Chen et al (2020)[8]	RT-PCR(E)	In	37/44	17/57	11/93	65/194	..	..	..	..	15/15	28/38	124/194	167/247
Lo et al (2020)[9]	RT-PCR (ORF1ab, N)	In	..	..	..	..	28/36	17/24	9/16	57/84	1/1	0/0	0/0	1/1
Wu et al (2020)[10]	RT-PCR	In	..	..	..	..	..	..	..	180/472	..	..	..	148/304
Pan et al (2020)[11]	RT-PCR (N)	In	8/9	2/12	0/1	10/22	..	..	..	..	6/7	4/10	0/1	10/18

*Week 1 (Wk1), week 2 (Wk2) and week 3(Wk3) are 0-7, 8-14 and >14 days after symptoms onset, retrospectively. Virus detection in oropharyngeal (OP), nasopharyngeal (NP) and sputum (SP) samples.

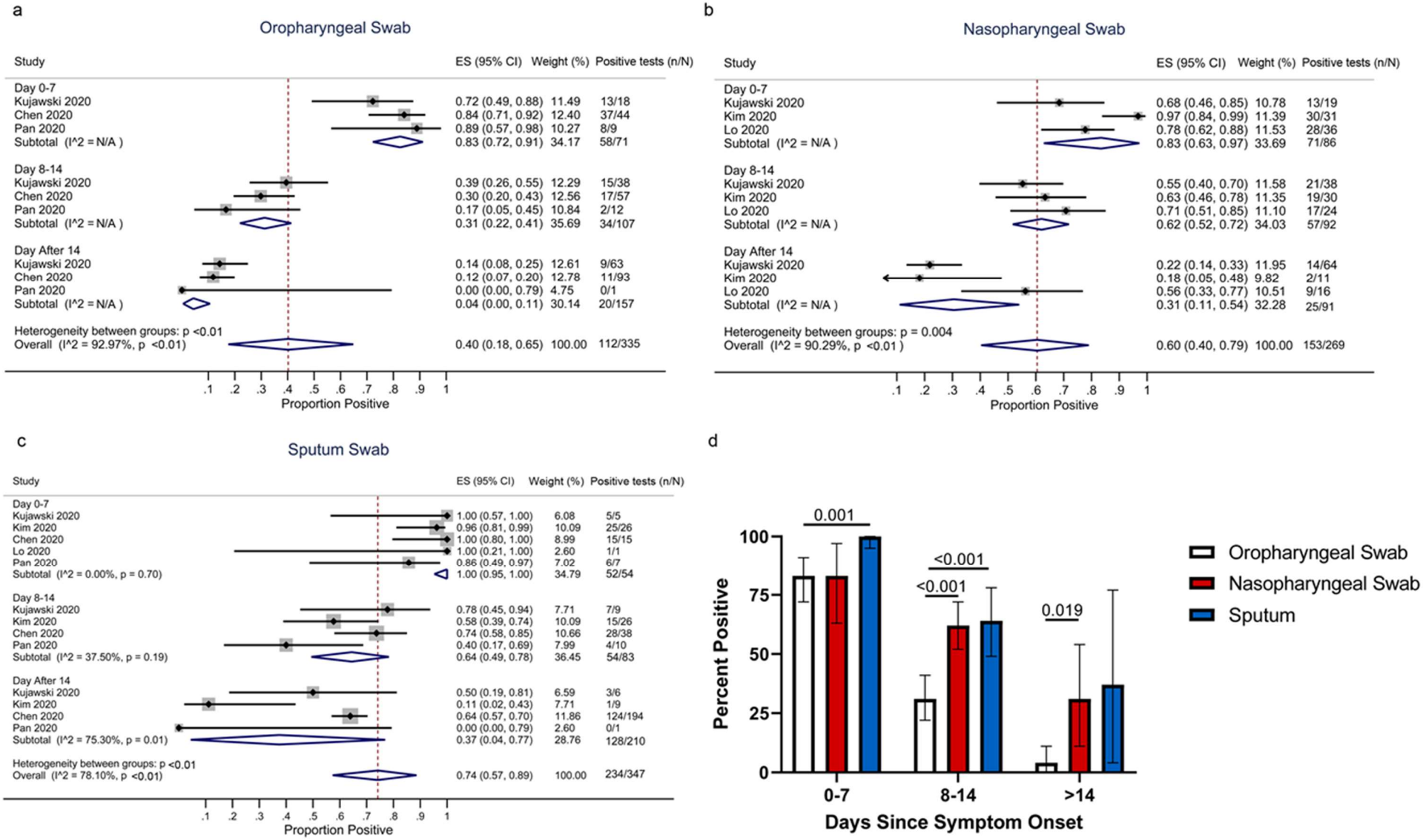
Supplemental Table 2. Participant inclusion criteria for each study

	SARS-CoV-2 inclusion criteria for included participants
Kujawski et al (2020)[1]	Positive RT-PCR in NP swab or OP swab or sputum
Kim et al (2020)[2]	Positive RT-PCR in NP swab or OP swab
Lin et al (2020)[3]	Positive RT-PCR in both OP swab and sputum specimen
Yu et al (2020)[4]	Positive RT-PCR in NP swab or OP swab or sputum
Wang et al (2020)[5]	Positive RT-PCR from an unspecified site
Yang et al (2020)[6]	Confirmed per “Chinese CDC guideline"
Chan et al (2020)[7]	Positive RT-PCR from NP swab or OP swab or serum
Chen et al (2020)[8]	At least two RT-PCR positive OP swabs
Lo et al (2020)[9]	Positive RT-PCR in NP swab or sputum
Wu et al (2020)[10]	Positive RT-PCR in NP swab
Pan et al (2020)[11]	Positive RT-PCR in OP swab or sputum

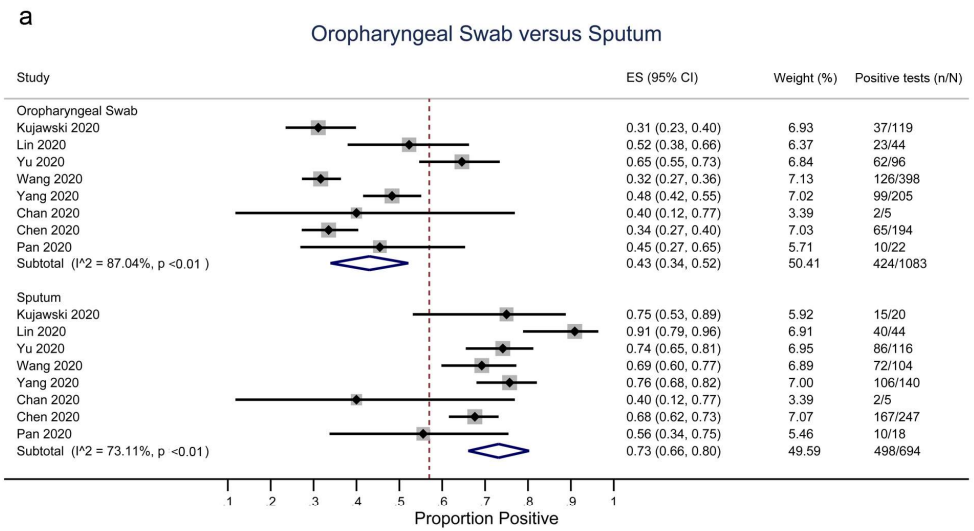
NP, nasopharyngeal; OP, oropharyngeal

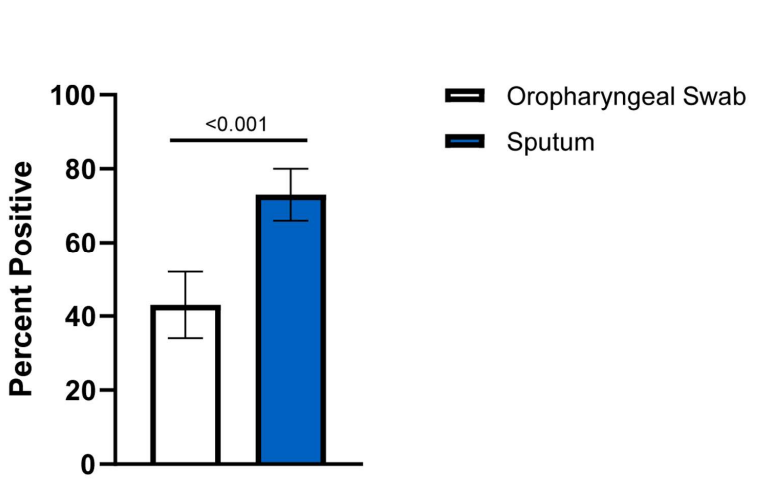


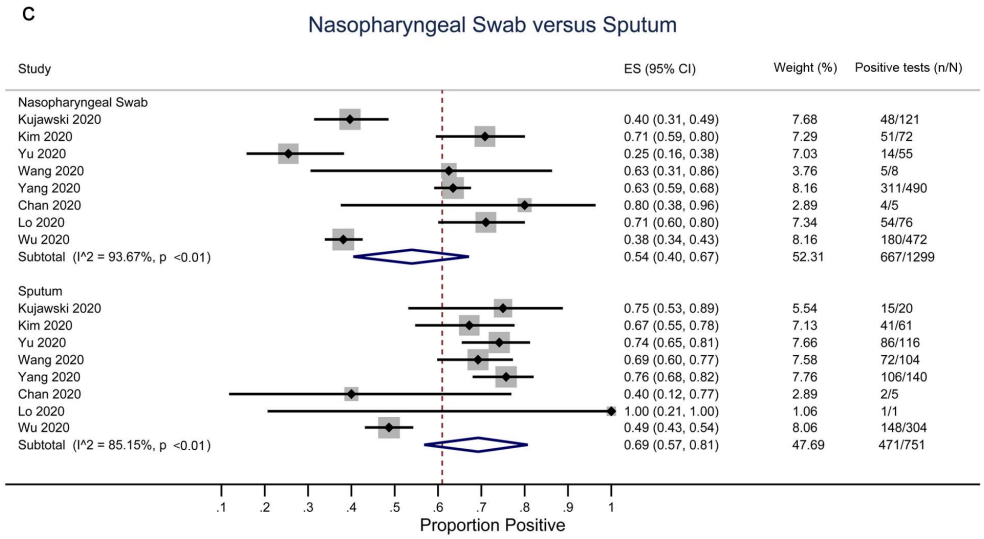
Supplemental Figure 1. Rates of SARS-CoV-2 detection by three methods of sampling excluding preprints. Forest plots of detection rates for oropharyngeal swabs (a), nasopharyngeal swabs (b), and sputum (c), and in a pooled analysis (d). The error bars in (d) are 95% confidence intervals (95% CIs). P-values were calculated by the Z-test.

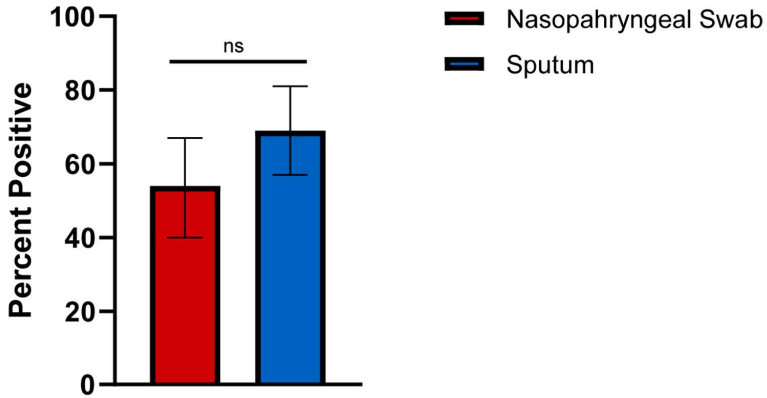


Supplemental Figure 2. Rates of SARS-CoV-2 detection by three methods of sampling in three time points (0-7, 8-14 and >14 days post symptom onset. The pre-print study was removed for this analysis. Forest plots of detection rates for oropharyngeal swabs (a), nasopharyngeal swabs (b), and sputum (c). The three sites of sampling were compared with each other based on three time points post symptom onset (d). The error bars in figure 1 d are 95% Confidence Interval (95% CI). P-values were calculated by the Z-test.









Supplemental Figure 3. Rates of SARS-CoV-2 detection restricted to studies with sputum sampling. Sputum results are compared to oropharyngeal swabs (a, b) and nasopharyngeal swabs (c, d). The error bars in (b, d) are 95% confidence intervals (95% CIs). P-values were calculated by the Z-test. NS, non-significant.

References

1. Team C-I. Clinical and virologic characteristics of the first 12 patients with coronavirus disease 2019 (COVID-19) in the United States. *Nat Med* 2020.
2. Kim ES, Chin BS, Kang CK, et al. Clinical Course and Outcomes of Patients with Severe Acute Respiratory Syndrome Coronavirus 2 Infection: a Preliminary Report of the First 28 Patients from the Korean Cohort Study on COVID-19. *J Korean Med Sci* 2020; **35**(13): e142.
3. Lin C, Xiang J, Yan M, Li H, Huang S, Shen C. Comparison of throat swabs and sputum specimens for viral nucleic acid detection in 52 cases of novel coronavirus (SARS-Cov-2)-infected pneumonia (COVID-19). *Clin Chem Lab Med* 2020.
4. Yu F, Yan L, Wang N, et al. Quantitative Detection and Viral Load Analysis of SARS-CoV-2 in Infected Patients. *Clin Infect Dis* 2020.
5. Wang W, Xu Y, Gao R, et al. Detection of SARS-CoV-2 in Different Types of Clinical Specimens. *Jama* 2020.
6. Yang Y, Yang M, Shen C, et al. Evaluating the accuracy of different respiratory specimens in the laboratory diagnosis and monitoring the viral shedding of 2019-nCoV infections. *medRxiv* 2020: 2020.02.11.20021493.
7. Chan JF, Yuan S, Kok KH, et al. A familial cluster of pneumonia associated with the 2019 novel coronavirus indicating person-to-person transmission: a study of a family cluster. *Lancet* 2020; **395**(10223): 514-23.
8. Chen C, Gao G, Xu Y, et al. SARS-CoV-2-Positive Sputum and Feces After Conversion of Pharyngeal Samples in Patients With COVID-19. *Ann Intern Med* 2020.
9. Lo IL, Lio CF, Cheong HH, et al. Evaluation of SARS-CoV-2 RNA shedding in clinical specimens and clinical characteristics of 10 patients with COVID-19 in Macau. *Int J Biol Sci* 2020; **16**(10): 1698-707.
10. Wu J, Liu J, Li S, et al. Detection and analysis of nucleic acid in various biological samples of COVID-19 patients. *Travel Med Infect Dis* 2020: 101673.
11. Pan Y, Zhang D, Yang P, Poon LLM, Wang Q. Viral load of SARS-CoV-2 in clinical samples. *Lancet Infect Dis* 2020; **20**(4): 411-2.