

Detection of SARS-CoV-2 in Different Types of Clinical Specimens

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Patients:

205 patients with confirmed COVID-19 infection from January 1 through February 17, 2020

Methods

1. Detection of SARS-CoV2 was done by RT-PCR. A cycle threshold value less than 40 is interpreted as positive for SARS-CoV-2 RNA.
2. Pharyngeal swabs were collected from most patients 1 to 3 days after hospital admission.
3. Blood, sputum, feces, urine, and nasal samples were collected throughout the illness
4. Bronchoalveolar lavage fluid and fibrobronchoscope brush biopsy sampled from patients with severe illness or undergoing mechanical ventilation

Results

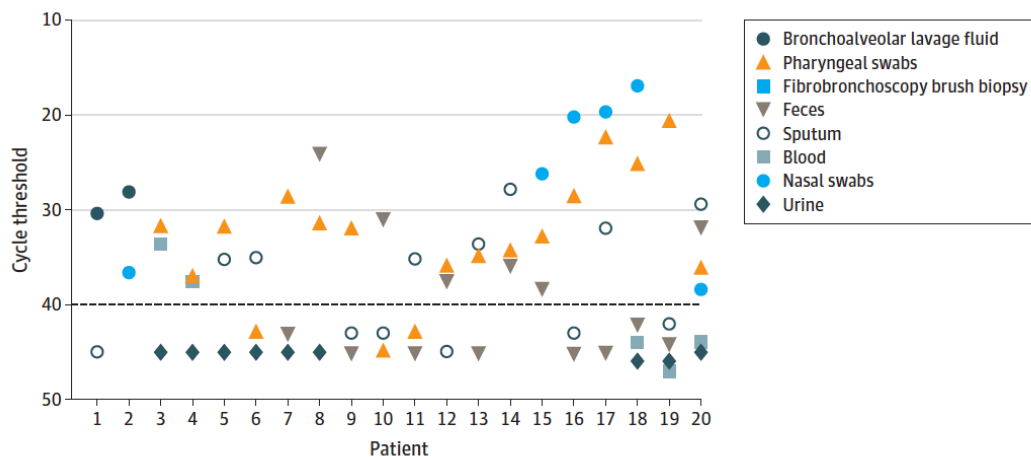
- 1070 specimens collected
- Age = 44 years (mean, range,5-67 years)
- Male = 68%
- 19% had severe illness.
- Most of the patients presented with fever, dry cough, and fatigue
- Live virus was detected in feces of 2 patients without diarrhea
- The mean CT values of all specimen types were >30 except for nasal swabs with a mean CT value of 24.3 indicating higher viral loads (Table).
- Twenty patients had 2 to 6 specimens collected simultaneously (Figure).

- SARS-CoV2 detection rate (ranked highest to lowest)
 - Bronchoalveolar lavage fluid: 93% (14 of 15)
 - Sputum: 72% (72 of 104)
 - Nasal swabs: 63% (5 of 8)
 - Fibrobronchoscope brush biopsy: 46% (6 of 13)
 - Pharyngeal swabs: 32% (126 of 398)
 - Feces: 29% (44 of 153)
 - Blood: 1% (3 of 307)
 - None of the 72 urine specimens tested Positive.

Table. Detection Results of Clinical Specimens by Real-Time Reverse Transcriptase-Polymerase Chain Reaction

Specimens and values	Bronchoalveolar lavage fluid (n = 15)	Fibrobronchoscope brush biopsy (n = 13)	Sputum (n = 104)	Nasal swabs (n = 8)	Pharyngeal swabs (n = 398)	Feces (n = 153)	Blood (n = 307)	Urine (n = 72)
Positive test result, No. (%)	14 (93)	6 (46)	75 (72)	5 (63)	126 (32)	44 (29)	3 (1)	0
Cycle threshold, mean (SD)	31.1 (3.0)	33.8 (3.9)	31.1 (5.2)	24.3 (8.6)	32.1 (4.2)	31.4 (5.1)	34.6 (0.7)	ND
Range	26.4-36.2	26.9-36.8	18.4-38.8	16.9-38.4	20.8-38.6	22.3-38.4	34.1-35.4	
95% CI	28.9-33.2	29.8-37.9	29.3-33.0	13.7-35.0	31.2-33.1	29.4-33.5	0.0-36.4	

Figure. Severe Acute Respiratory Syndrome Coronavirus 2 Distribution and Shedding Patterns Among 20 Hospitalized Patients



The specimen with a cycle threshold value above the dashed line is interpreted as positive for SARS-CoV-2 RNA; those under, negative.

Conclusion:

1. SARS-CoV-2 was detected in specimens from multiple sites with lower respiratory tract samples most often testing positive.
2. Live virus was detected in feces, implying that SARS-CoV-2 may be transmitted by the fecal route.
3. Testing of specimens from multiple sites may improve the sensitivity and reduce false-negative test results